ENGINEERING AND MINING JOURNAL

A McGRAW-HILL PUBLICATION

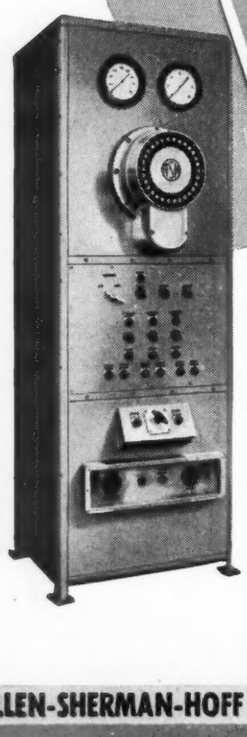
JULY, 1948

Science Library JUL 17 1948

Skimming reverberatory slag at smelter of O'okiep Copper Co., South Africa.

Deep Ore Discovery at Silver Summit Mine—Page 70

Lettin' the Cat outta the Bag!



Left— A-S-H Automatic Sequence Head of the Automatic Sequence Hydrovac. Note that the initials of both are the initials of our company's name, A-S-H, Allen-Sherman-Hoff. This equipment "practically thinks for itself," and while its initial cost is higher than manually operated systems, it is actually more economical in the long run, because of what it saves in time and maintenance. Often it pays for itself in about a year.

It took five long years of designing, experimenting and building to perfect the new Automatic Sequence Remote Control Hydrovac System for handling anything from the finest dust up to loose, bulk granular materials of various sizes. To the men and companies contributing to this development, quite aptly referred to as the "Pneumatic Materials Handling System of Tomorrow," we express our heartfelt thanks. . . . We are "Lettin' the Cat Outta the Bag" with the publishing of a new catalog, covering manual and automatic systems for handling material in metal and non-metallic mines, coal burning generating and heating plants, process industries, etc. . . . A letter from you will bring one of the catalogs very promptly. If your problem is urgent, tell us in the letter that you want an engineer to bring the catalog and discuss your particular job with you.

ALLEN-SHERMAN-HOFF CO., 229 S. 15th ST., PHILADELPHIA 2, PA. ***Offices & Representatives in Principal Cities***

ENGINEERING AND MINING JOURNAL

ALFRED M. STAEHLE, Publisher **EVAN JUST, Editor** **H. R. MATHIAS, General Manager**

H. C. PARMELEE, Editor Emeritus; A. H. HUBBELL, Managing Editor; R. H. RAMSEY, A. W. KNOERR, Associate Editors; H. H. WANDERS, Market Editor; R. L. STRONG, F. W. BROOKE, Assistant Editors; F. A. ZIMMERLI, Layout Editor. San Francisco: J. B. HUTTL, Associate Editor; G. J. YOUNG, Consultant. Washington: PAUL LEACH, Jr.

Volume 149 **Number 7**

A McGRAW-HILL PUBLICATION

McGRAW-HILL PUBLISHING COMPANY, INC.

James H. McGraw (1860-1948)
Founder

JAMES H. McGRAW, JR., President; CURTIS W. McGRAW, Vice President and Treasurer; EUGENE DUFFIELD, Executive Assistant for Publications; NELSON BOND, Director of Advertising; JOSEPH A. GERARDI, Secretary; DEXTER KEEZER, Director, Economics Department; J. E. BLACKBURN, JR., Director of Circulation.

•

Company Offices

Publication office: 330 West 42nd St., New York 18, N. Y. Editorial and Executive Offices: 330 West 42nd St., New York 18, N. Y. Cable address: McGraw-Hill, New York. Branch Offices: San Francisco 4, 68 Post St.; Chicago 11, 520 N. Michigan Ave.; Los Angeles 14, Pacific Finance Bldg.; Washington, D. C., National Press Bldg.; Pittsburgh 22, 738-9 Oliver Bldg.; Detroit 26, 2980 Penobscot Bldg.; Cleveland 15, 1510 Hanna Bldg.; Boston 16, 1427 Statler Bldg.; Philadelphia 3, 17th & Sansom Sts., Atlanta 3, 1011 Rhodes-Haverty Bldg.; St. Louis 8, Continental Bldg. District Managers: New York, T. E. Alcorn, F. W. Roets; Philadelphia, W. A. Potter; Cleveland, W. M. Spears; Pittsburgh, H. C. Chellson; Chicago, C. J. Coash and G. A. Mack; San Francisco, J. W. Otterson; Atlanta, R. C. Maultsby; Los Angeles, R. N. Phelan, London address: McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C. 2, England. Cable address: Blacklash Estrand, London. Other McGraw-Hill foreign news offices in Paris, Berlin, Moscow, Prague, Shanghai, Bombay and Mexico City.

•

Subscription Information

ENGINEERING AND MINING JOURNAL, July, 1948, Vol. 149, No. 7. Published monthly at New York, N. Y. Return postage guaranteed. Subscription rates: United States and possessions $3 a year, $4 for 2 years, $5 for 3 years. Canada $4 a year, $6 for 2 years, $8 for 3 years. Pan American countries $5 a year, $8 for 2 years, $10 for 3 years. Elsewhere $15 a year, $25 for 2 years, $30 for 3 years. Please indicate position and company connection in all subscription orders. Price of this issue, 50 cents. Entered as second class matter April 29, 1948, at the post office at New York, N. Y., under the Act of March 3, 1879.

JULY 1948

Editorials	67
Silver Summit Opens Rich Ore	70
Diamond Mining in Brazil	74
Who Has the Gold	76
Electronic Rotating Indicator and Belt Protector for Mills	80
How Metallizing Solves Mine Maintenance Problems	82
Aluminum in the Mining Industry	85
Building an Earth-Fill Dam in Arctic Territory	90
Grouting Stops Compressor Sway	93
Bubble-Particle Contacts in Flotation	95
Coordinatograph Aids Mine Surveying	98
Market Summary	99
Washington Reflections	102
News of the Industry	104
Operating Ideas	106
Equipment News	112
Personal News	118
New Books	123
Regional News	124

Copyright 1948, McGraw-Hill Publishing Co., Inc. All rights reserved.

CHANGE OF ADDRESS

DIRECTOR OF CIRCULATION
Engineering and Mining Journal, 330 West 42nd Street, New York 18, N. Y.
Please change the address of my Engineering and Mining Journal subscription.

NAME.....

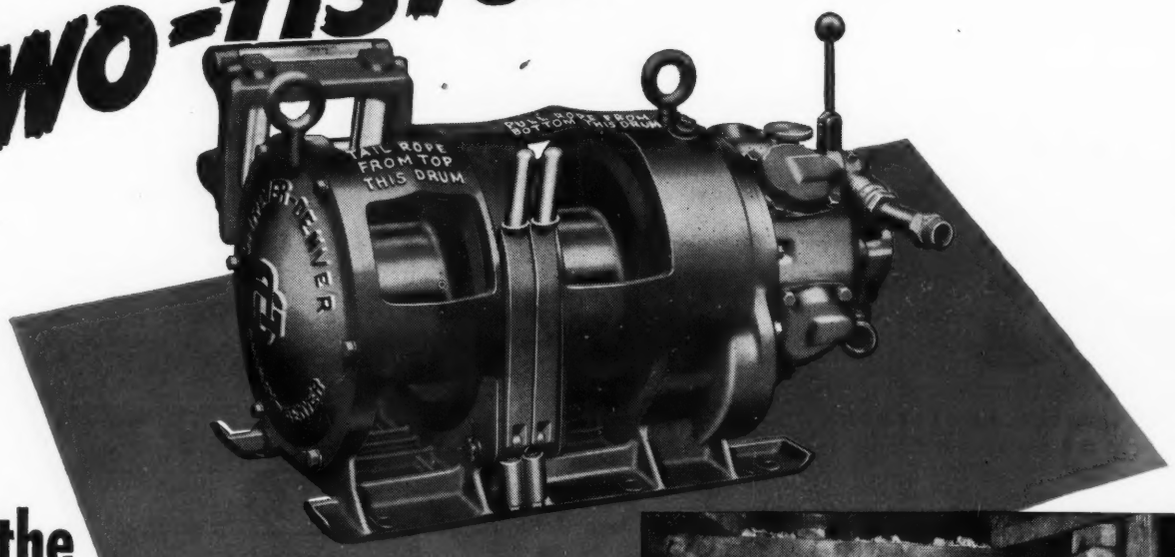
OLD ADDRESS.....

NEW ADDRESS.....

NEW COMPANY CONNECTION.....

NEW TITLE OR POSITION.....

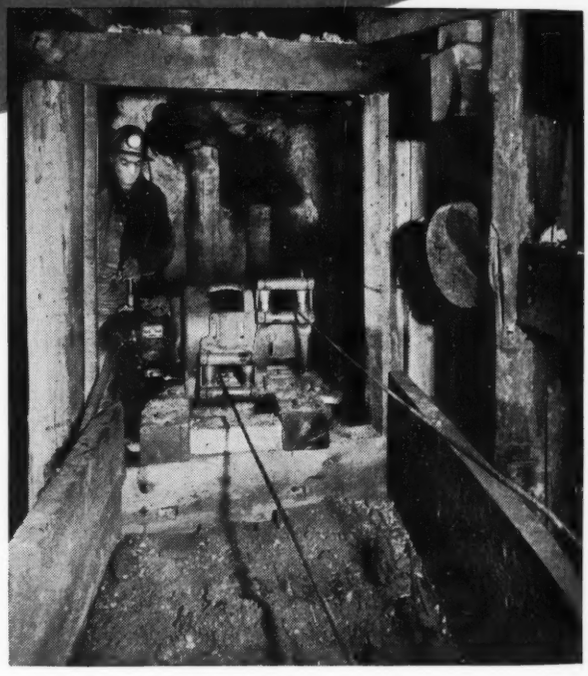
two-fisted slushing power . .



at the touch of a finger!

That's what you get when you operate the powerful Gardner-Denver Airslusher. For a *single* throttle lever controls slusher speed and direction—automatically returns to neutral when released—operates so easily it can be moved with only two fingers!

This simple lever operates an extremely high torque five-cylinder radial air motor that assures greater crowding even at low speeds; develops maximum power in either direction; operates only when doing useful work—saving air and prolonging motor life. Why not ask for a demonstration? Or, write Gardner-Denver Company, Quincy, Illinois.



- **EASY TO TRANSPORT**—*compactly built, light in weight, it is easy to move through small raises and chutes.*
- **SIMPLICITY OF TRANSMISSION**—*compared to planetary transmissions, the Airslusher has one-third the number of gears—bearings—oil seals—lubrication points.*
- **COMPLETE PROTECTION OF WORKING PARTS**—*lubricant is sealed in—water and dirt are sealed out.*
- **NO CLUTCH FACING TO WEAR**—*roller clutch automatically engages one drum, releases the other, as the throttle is reversed—nothing to adjust or lubricate.*

GARDNER-DENVER SINCE 1859

For complete information, write Gardner-Denver Company, Quincy, Illinois

ENGINEERING AND MINING JOURNAL

JULY, 1948

Proposed Venture-Capital Incentives

THE VITAL IMPORTANCE to both the mining industry and the public welfare of providing sufficient incentives for venture capital to enter mining is widely understood in the mining industry and championed by its leaders. Less widely understood is the necessity for broad understanding of this technical subject, unanimity of purpose, and strong grass-roots support for appropriate corrective measures. We proceed herewith to discuss some of the technical details.

In a recent conversation on this subject the view was expressed that special provisions are not necessary, because if sufficient new supplies are not discovered and developed to overtake depletion, the normal play of supply and demand in due course will result in mineral prices that will themselves constitute adequate incentives. No doubt this is true. However, in weighing the desirability of such a course, either from the industry or public interest viewpoint, we must consider the lag that takes place between the establishment of incentives and the productive results. The industry has been delivering most of its products at prices below replacement costs for at least three decades. If we expect price alone to furnish the incentives for the reestablishment of adequate known reserves, the process is likely to take two or three decades, during which time consumers probably will have to pay fancy prices for their needs and more than will be necessary after equilibrium is reached. Such a zigzag price course we doubt to be to the advantage of either producers or consumers. Thus, we believe that special tax incentives to venture capital are decidedly in the public interest.

What form should such incentives take? The able tax committee of the American Mining Congress suggests that the law should permit carry-forward and carry-back privileges in regard to depletion allowances as well as profits and losses, a suggestion which we heartily endorse. This would permit lumping together a loss period and a profit period and computing the depletion allowance with respect to the average. At the present time the depletion allowance, being limited to 50% of net profit, is lost in a loss year, and thus cannot be carried forward or back.

This committee also recommends, and we endorse, abolishing double taxation of dividend income, and treatment as expense rather than capital investment all advance costs of mining incurred after the determination of the existence of a commercial deposit. The practice of forcing capitalization of development costs is one of the many ways in which the Treasury chisels the taxpayer beyond the intent of Congress and common-sense interpretation of law.

Many people alert to the necessity of improving venture capital incentives have suggested such remedies as the following: (1) Increasing the percentages involved in computing percentage depletion; (2) Eliminating the 50% of net profit depletion allowance limitation; and (3) Permitting full deduction as expenses of all exploratory and early stage development costs. Obviously the benefits of any of these alternatives would be substantial. However, they are open to the rather serious objection that they would tend to tear the depletion allowance away from its accounting and historical precedents, making it pretty much an act of legislative grace. Thus it would be more vulnerable to attack by future politicians seeking whipping boys for selfish purposes.

Another line of suggested remedies concerns the treatment of capital gains and losses. Some would reduce the present rate of capital-gain taxation. Others would liberalize the treatment of capital losses. That either or both of these remedies would prove to be powerful stimulants to venture capital investment is unquestionable. However, in regard to a lower tax rate on capital gains we run into the practical problem of acceptability to Congress. Congress has the responsibility of providing sufficient revenue to meet the expenses of Government. With such high rates on income as they feel it necessary to impose, it seems questionable that they could be persuaded to give substantial added advantages to capital gains. Turning to the treatment of capital losses, it seems to us that full deductibility of losses, with full carry-back and forward privileges, is sound both from the standpoint of equity and appeal. Also, such treatment would go a long way toward answering the complaint that the business of entering

new mining ventures is unattractive because there is no way of recouping expectable losses from expectable gains.

Because, in our opinion, the vital national importance of stimulating new enterprises can hardly be overstressed, we repeat our recommendation (E&MJ, May, p. 71) for a three-year income tax exemption for new enterprises after reaching the profitable stage, plus two additional years for mining ventures because of the additional risk involved in them.

To those who would criticize our suggestions as largely adding to privileges for the privileged, we repeat that we are simply trying to solve the practical problem of tapping with adequate incentives those capital resources which can appropriately be regarded as venture capital. Moreover, the process of bringing new viands to the table of humanity is a noble service that helps all and deprives nobody. Also, as stated before, the greatest beneficiaries of the development of new industries are those who would be the earliest and worst sufferers from widespread unemployment.

Statesmanship Triumphs in Chile

ONE OF THE MOST auspicious developments of recent months is the announcement that the Chilean Government and the Chile Exploration Co., Anaconda affiliate, have reached an agreement whereby the company feels warranted in making further large investments at the Chuquicamata mine (E&MJ, June, p. 105).

The company will now proceed with the construction of a 25,000-ton flotation concentrator for sulphide ores, a smelter, and auxiliary facilities at an estimated cost of 60 million dollars. Further investments, to a contemplated total of 130 million dollars, are planned, as market conditions and exhaustion of the oxide zone call for additional capacity to handle sulphide ores.

This agreement is complimentary to both the Chilean Government and Anaconda. Realists must sympathize with those who must finance government in countries with unbalanced economies, and commend the far-sighted statesmanship necessary to forswear overtaxing large organizations which bring depletable resources to market. No doubt this decision had to be made in the face of considerable pressure from the left wing and assorted demagogues. The company is commendable for its courage in going ahead and taking its chances with the future as, after all, no government can fully commit its successors to office. Both sides are to be complimented for the spirit of constructive cooperation in which the agreement was reached.

We hope that this event will pave the way to better understanding throughout the world of the desirability of encouraging intelligent, fair-minded capital. Possibly people are realizing that the chaps who love to vilify the capitalist have nothing to offer on the constructive side, and that the service rendered by a capable, ethical organization like Anaconda far outweighs what is abstracted as profit.

Subsidy Legislation on Dead Center

BECAUSE a House of Representatives group proceeded to ignore the views of a large segment of informed opinion, both in and out of Government, no action has been taken on proposed mine production and exploration legislation (E&MJ, June, p. 101 and this issue, p. 102). This is unfortunate, as with the matter still in doubt, nobody is satisfied. Also, marginal operators are left in a quandary as to ceasing operations or struggling on in the hope of future assistance.

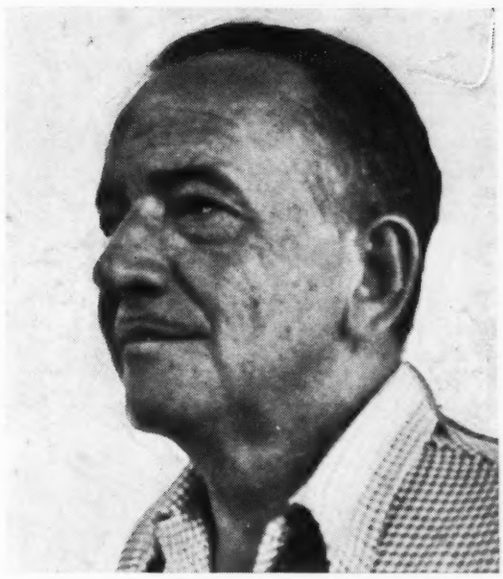
The only explanation we can see of House disregard of the industrial and Administration opinions, laboriously threshed out in months of discussion, is simple pork-barrel politics. Were they mindful of the health of either the industry or the Nation, the Congressmen could not have sponsored a bill so open to administrative abuse as H.R. 6623. This bill left a wide open gate for an administrator to play politics with subsidies or to use subsidies as a tool for Government encroachment into industrial functions. No administrator with the interests of the industry or the Nation at heart would want to operate under such a loosely drawn legislative mandate. Should he exercise any discretionary restraints, he would become the target of endless opprobrium from disappointed benefit seekers.

Despite the inconclusive results, we think the industry owes a vote of thanks to several men in industry and the Bureau of Mines who gave unstintingly of their time and efforts toward the writing of a workable bill. It seems a shame that when a satisfactory compromise was finally reached (E&MJ, May, pp. 105-6), it was callously thrown aside by the Congressmen and some shortsighted industry representatives.

Many in the mining industry would sigh with relief if they could assume that this is an end to the subsidy controversy. This we doubt, for the simple reason that the time will come when appropriate protection for domestic mining will again become a problem. Given the problems arising from depletion and declining self-sufficiency, orthodox tariff protection will be unduly harsh on either marginal operations or consumers.

New Mine Investment Is Vital

JOHN G. BARAGWANATH
Vice-president, Freeport Sulphur Co.



JOHN G. BARAGWANATH

A CONSIDERABLE NUMBER of metals and minerals of prime importance to our economy does not occur in commercial quantities in the United States. Fortunately our neighbors can supply some of these but others will always have to be shipped to us, in many instances over long distances. Intensive search for deposits of minerals in which we are deficient, and technological research leading to the ultimate utilization of low-grade deposits not at present commercial will be of some assistance but in all probability we will always be dependent on foreign sources for an adequate supply of many minerals. We should accept this situation as a fact and concentrate our thinking on the utilization of what we have or may have, devoting our energies to the problem of stimulating the production of minerals that can reasonably be expected to occur within our boundaries, by the search for and the development of new mines.

At the present rate of production our known ore reserves, with certain exceptions, are being depleted more rapidly than new sources of ore are being discovered. Admittedly new mines are becoming more difficult and much more expensive to find but there are other reasons why so few meritorious prospects are now being developed.

Large mining organizations tend to become conservative. They are as a rule unwilling to engage in prospecting, and I think rightly so, for that is not their function. Some companies will not even tackle a prospect which gives promise of becoming, say, a 100-ton operation because the potential profits therefrom will not add appreciably to their net incomes. They therefore confine their activities to the hunt for bigger game. Nevertheless, hundreds of important mines have been created as the result of the development and initial small-scale operation of unimpressive deposits.

The established mining companies do a good job but they are frequently deterred from embarking upon a new and therefore usually hazardous project because of the high taxes that begin to apply on the day the first bar is poured or the first ton of concentrates shipped. With 40% of the net operating profit lopped off by taxation, they reason with considerable logic that the return of capital spent in development and equipment is too slow to justify them in taking the risk involved, and consequently another promising prospect is abandoned.

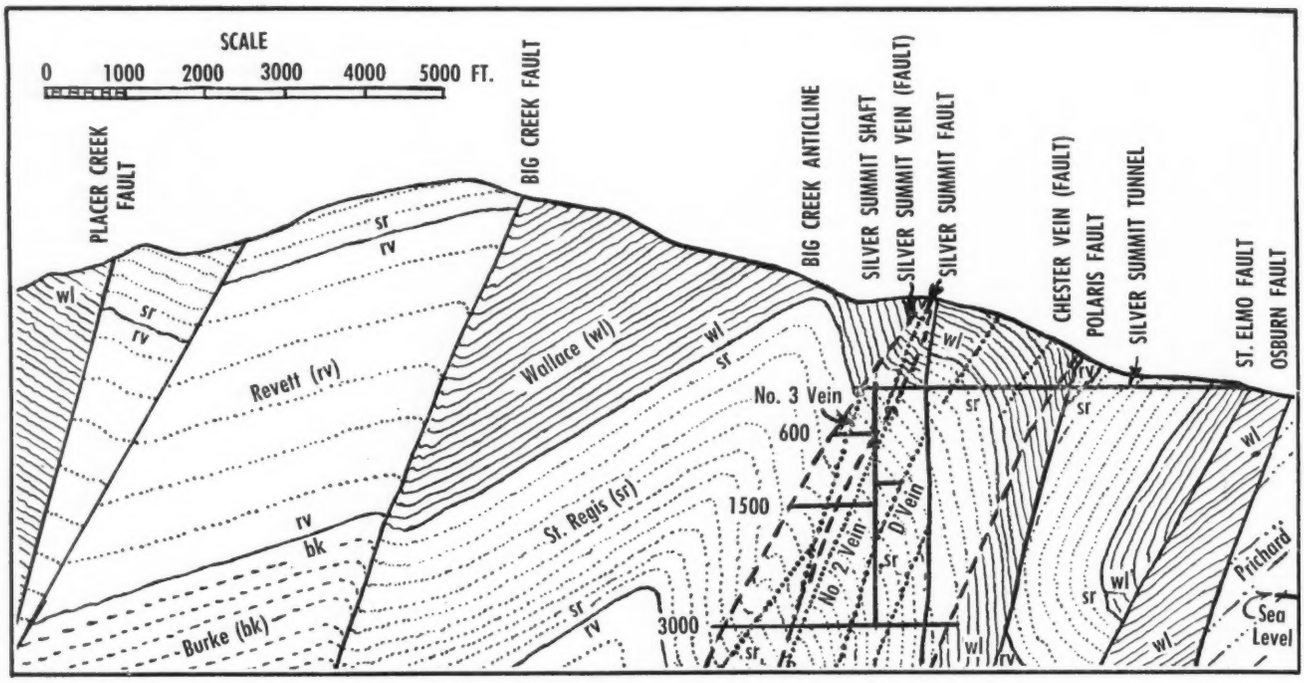
As recently as twenty-five years ago men of wealth were quite willing to back prospecting parties in the field or to take a flier on mining properties brought to their attention. Individually or in groups they would provide the risk capital necessary for the development of likely-looking showings to the point where additional funds for equipment and operation were easy to raise. Such men today, in high income brackets, cannot afford to do this; if the venture is a failure they lose; if it is a success too many years must elapse before they even can recover their initial investment. The gamble is no longer attractive, and as a result this source of money for new mining projects has ceased.

Many of the great mines in this continent, perhaps most of the older ones, were developed by the public through the medium of stock companies shares which were bought by people in all financial categories. In those years the man of small means had an opportunity to gamble on the success of a mining venture. Many of them won. Some made fortunes. But today, because of the restrictions imposed by the Securities and Exchange Act and similar state laws, these men are discouraged from taking such chances with their own money. There are, however, no restraints on playing the horses and bucking the slot machines or roulette tables. I have yet to hear of a fortune founded in a crap game or at the races. Participation by the public in legitimate mining risks is no longer feasible.

Numerous ideas have been advanced and countless discussions have taken place on how the basic and vital mining industry of this country may be perpetuated. In my opinion there are two ways in which this can be accomplished. Both represent sounder means of stimulating the search for new mines and the development of prospects than any premium price plan, or bonus system that can be devised.

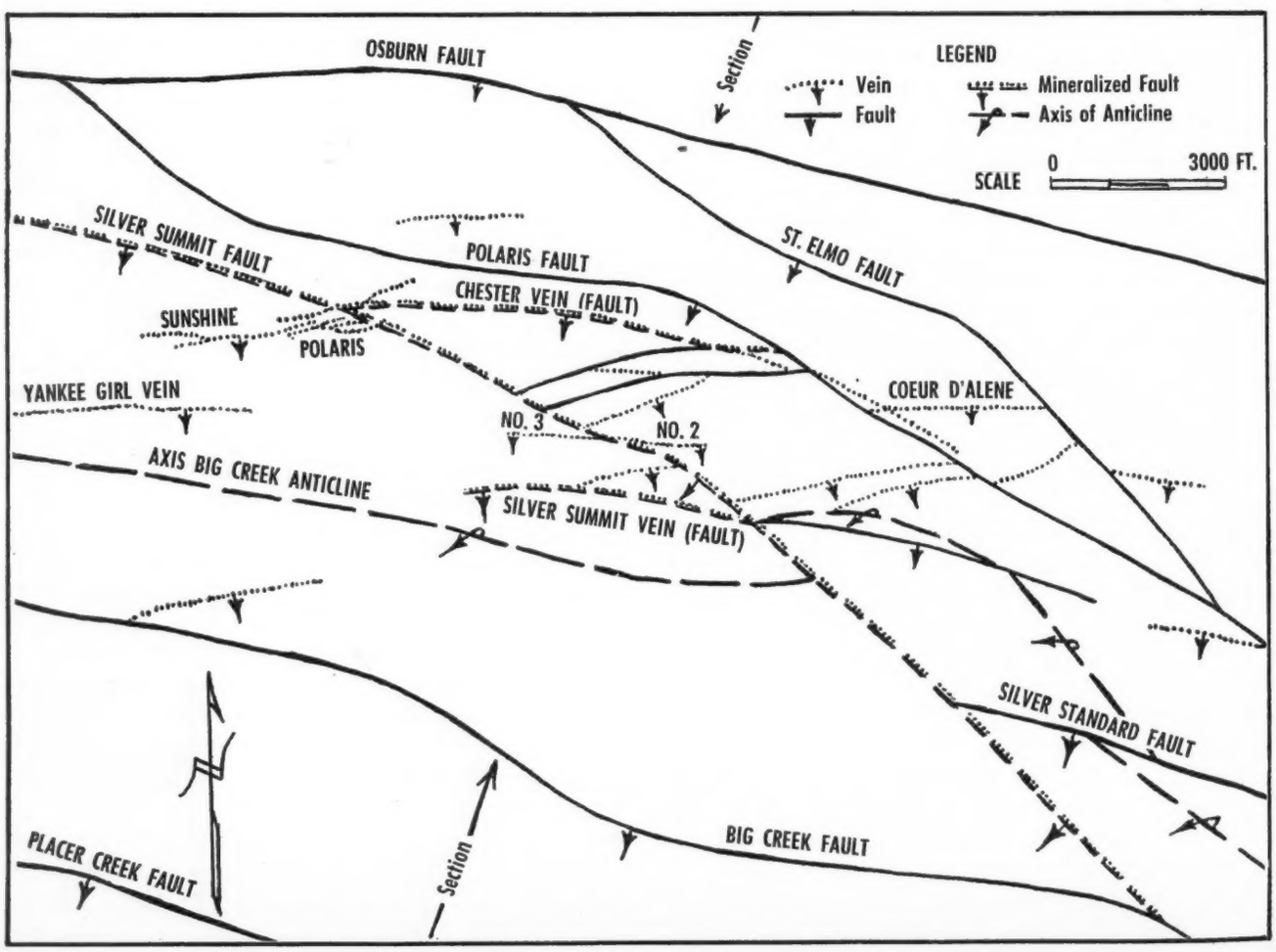
1. The establishment of a period of exemption from taxation for new mining ventures, such as Canada wisely provides, which would enable the operator to get some of his bait back before being introduced to the tax collector.

2. A modification of the Securities and Exchange Act which would insure a measure of protection to the investor in new mining issues and still afford him a reasonable opportunity to participate once more in the development of American mining enterprise.



GENERALIZED SECTION through Silver Summit shaft looking westerly.

Silver Summit Opens Rich Ore



GENERALIZED FAULT-VEIN PLAN at elevation of 3000 level of Silver Summit operations.

In a previous article "Deep Discoveries Intensify Coeur d'Alene Activities," (E&MJ, Oct., 1947), the author described and illustrated significant mining projects in the Coeur d'Alene district. Subsequent exploration has resulted in the discovery of a rich orebody in the Silver Summit workings at a depth of 4,400 ft. below the surface, and some 4,600 ft. east of the last high-grade ore developed in the Omega and Rotbart areas from the deep levels of the Sunshine mine.

In this article Mr. Sorenson describes the recent Silver Summit strike in detail, and discusses geological theory which is aiding in delineating probable mineralized areas in the Silver Belt.

ROBERT E. SORENSON*

Geologist, Hecla Mining Company, Wallace, Idaho.

THE SILVER SUMMIT MINE is situated in the Silver Belt of the Coeur d'Alene district in Shoshone County, Idaho, midway between Wallace and Kellogg and south of the South Fork of the Coeur d'Alene River and U. S. Highway No. 10.

The enterprise has had a history of sporadic development, beginning prior to 1930, when Harry Pearson and associates consolidated several groups of claims, located others, and began driving the main tunnel. The Silver Summit vein was reached in 1931. Because this tunnel was well located with its portal in the main valley and near highway and railroad, Polaris Mining Co. arranged to extend the tunnel to its orebody, which was accomplished during 1935 and 1936. The Polaris ore was removed through this tunnel to the mill at the portal. Somewhat later, Silver Summit began sinking the shaft which is situated about 8,600 ft. easterly from the Jewell shaft of the Sunshine Mining Co. The 600 level crosscut to the Silver Summit vein was completed in 1939, the shaft was sunk to the 1500 level and drifting on the vein was completed there in 1941. Some of the latter work was financed through the Polaris Mining Co. The present development program, financed by Polaris, began in 1945. Shaft sinking was started from the 1500 level in February, 1946, and completed to the 3000 level prior to Dec. 1, 1946. In February, 1948, the south crosscut on the 3000 level was completed to a point 2,100 ft. south of the shaft.

The Silver Summit property is situated in the structurally disturbed area south of the Osburn fault and north of the Big Creek fault, both major fault structures of the Silver Belt.[1] Formations exposed on the surface and underground are part of the Belt Series of Pre-Cambrian metamorphosed sediments. (See vertical section.) The youngest is the Wallace formation, a 4,500 to 6,000-ft. section of gray to white calcareous quartzite, and gray to black calcareous argillite, underlaid by the St. Regis formation which is composed of purplish to purplish-gray argillite and quartzite up to 1,400 feet in thickness.[2] Below the St. Regis are the Revett, Burke and Prichard formations — none of which are exposed in the Silver Summit development. The property is traversed by the Big Creek anticline which is an overturned fold with many associated minor folds on its north flank. Easterly-westerly zones, approximately parallel to the axis of this fold, are extremely altered and bleached.

The term "bleaching" in the Coeur d'Alene district is loosely used to include very strong deep-seated alteration effects involving bleaching of the gray and black colors of the Wallace formation and the purplish colors of the St. Regis formation to a rather uniform greenish-gray to white color. The process involves the development of abundant sericite accompanied by pyrite and the carbonate minerals, calcite, ferro-dolomite, ankerite and siderite. These bleached zones in the Silver Belt appear to mark the zones of more intense mineralization.

On the Silver Summit tunnel level there is a bleached zone approximately 2,000 ft. wide. As greater depth was reached in the shaft development, the zone of bleaching divided into narrow bands so that on the new 3000 level, approximately 340 ft. below sea level, 3,225 ft. of crosscutting has exposed more than a dozen zones of bleaching varying from 10 to 300 ft. in width. The widest zone of alteration is closely associated with the south-dipping reverse Silver Summit fault, which forms a northwesterly striking structural link between the large normal Osburn fault on the north and the reverse Big Creek fault on the south. This Silver Summit fault is closely associated with the Sunshine, Polaris and Chester veins, which have produced most of the rich silver ore westerly from Silver Summit. This fault is known for a length of more than five miles.

Ore Found in Bleached Zone

As the 3000 level southerly crosscut approached the Silver Summit fault, unaltered purple St. Regis rocks gave way to intensely bleached rocks containing abundant sericite. Twenty feet from the contact, and within the bleached rocks, the crosscut exposed a 6-ft. vein containing 2 ft. of siderite, tetrahedrite and chalcopyrite which assayed 33.8 oz. silver and 5% copper. This is called the Silver Summit No. 2 vein. Extension of the crosscut proved this bleached zone to be about 300 ft. wide. The Silver Summit fault passes through the center of the zone of alteration. With it a few minor stringers of quartz and siderite were found to contain only minor amounts of tetrahedrite and chalcopyrite. South of the fault to the southerly limit of the bleached zone the rocks are extremely altered

*Adapted from a paper presented before the Idaho Mining Association, Sun Valley, Idaho, June, 1948.

and many stringers of quartz and siderite are present. The zone is well silicified and sericitized and contains much pyrite disseminated through the bleached rock.

Drill Hole Reveals Ore

After completion of the main south crosscut, drifts were started both easterly and westerly on the No. 2 vein but, within a short distance, the mineralization weakened in both drifts. Toward the west the structure was followed for more than 300 ft. without the discovery of a minable shoot, although a few scattered samples approached the lower limit of commercial grade, largely because of the copper content. In this westerly drift, at a point approximately 200 ft. from the crosscut, a diamond-drill hole was drilled southerly to explore the Silver Summit fault zone which was last seen in the crosscut. The first interesting mineralization was found 26 ft. from the collar of the hole where three 5-ft. sludge samples averaged 21 oz. silver. Core results substantially checked the sludge samples with 9 ft. averaging more than 26 oz. Another streak of rich sulphides was found 50 to 55 ft. from the collar. Shortly thereafter another hole was drilled 100 ft. westerly from the first hole and it cut 5 ft. of 40.5-oz. silver ore. A crosscut toward this interesting mineralization was started at the first opportunity and within a short distance the No. 3 vein was opened. Streaks of ore on the west wall were extremely rich and the diluted average assay of the first slab face was 9 ft. of 41.6 oz. silver and 0.51% copper. A specimen containing tetrahedrite and no visible chalcopyrite, selected to determine the silver-copper ratio, assayed 690.4 oz. silver and 4.52% copper, indicating a ratio of 152.7 oz. silver to 1% copper. This ratio exceeds any that we have on record in the Silver Belt. Continuation of the crosscut southerly opened the second vein which was indicated in the drill hole. No drifting has been done on this structure, although it appears to be rather strong, and a streak of high grade 0.4 ft. wide assays 140.5 oz. silver.

Drifting on the No. 3 vein was started on March 19 and was continued until May 7 opening the vein along 266 ft. of drift. Ore continued without interruption for 187 ft, averaged 7.5 ft. in width, and assayed 59.42 oz. silver (including one foot waste dilution). Thirty-five feet of low-grade material intervened before another short shoot was found. The drift was temporarily discontinued at this point to allow a raise to be started and drill holes to be drilled southerly to the No. 4 vein and northerly through the Silver Summit fault.

In the Silver Belt operations, usual practice, amply justified by experience, allows the geologist or engineer to assume as probable ore an extension above and below the drift equal to one-half the length of the oreshoot. With this method applied in this case, it would appear that the probable ore figure for the ore actually opened by drifting would exceed 22,000 tons containing 1,300,000 oz. of silver, the profit from which would amply repay the cost of development involved in extension of the shaft to the 3000 level and crosscutting and drifting the 500 ft. completed thus far. No account of the probable ore exposed by the drill holes is made in the above estimate although the most easterly hole exposes commercial ore at a point 150 ft. east of the discovery crosscut. This drill hole may not mark the easterly limit of the oreshoot.

Continued development of this new vein structure may expose other shoots of similar ore, and prospects both easterly and westerly along this same strong zone of bleaching and mineralization will explore other known veins as they approach this Silver Summit fault both on its hanging wall and footwall sides. (Since the writing of this manuscript, the westerly drift has entered good ore again on June 4.) The striking thing about the mineralization of note in the Silver Belt has been its close relationship with this overthrust, the overturned crumpled north flank of the Big Creek anticline, and the zones of intense bleaching.

Zones Extend Eastward

It is significant to note that this new orebody was discovered at a point 4,400 ft. vertically below the surface. On the upper levels the vein was opened in a few places, but it was always barren, weak and not unlike dozens of known but undeveloped veins in the district. This discovery should aid materially in bolstering the hopes of those engaged in similar development for it extends the zone of this type of high grade oreshoots more than 4,600 ft. easterly from the last rich ore developed in the Omega and Rotbart areas on the deep levels of the Sunshine mine. Similar strong zones of alteration in the same rock types, associated with similar structural conditions, exist for many miles toward the east, and in several places deep development programs are in progress or are being planned. Although all of them may not be successes, experienced geologists will be able to narrow the limit of the zones to be explored, thereby minimizing the risk involved.

Discoveries Spur Exploration

Present programs of deep development in the district result from the success of exploration under similar conditions in adjoining properties, at least in part. The Silver Belt activity dates back to the successful discoveries made in the Sunshine mine followed by the Polaris mine. Added encouragement of great moment resulted from the discovery of the Rambo-Omega-Rotbart orebody on the Chester vein in 1943 by Polaris,[1] followed by success in the development of the Silver Syndicate vein and the Yankee Girl vein from the deep levels of the Sunshine Mine. The Silver Summit program was designed to explore several properties and many vein structures. With this new high-grade discovery coming early in the program, it appears that the courage of the management of the Polaris Co. and its board of directors is being repaid in full.

The story of the development of the Silver Summit is one of persistence and faith, two qualities usually tied closely to mineral discoveries of note throughout the world. With these qualities and without geology, many mines of the past have been developed, and without these qualities geology would accomplish little. The present situation in the Coeur d'Alenes, as in most mineral areas, involves greater use of geology as a tool to accomplish the most development at the least cost. As geological knowledge of the district increases, more and more reliance is placed on the work of geologists in the selection of areas of probable interest, planning the best method of approach when considering geologic structure in relation to complex property situation, selecting areas for more specific attention, and directing the progress of day to day development. The progressive operators are making increasing use of this tool for directed development, just as they are adopting every mechanical means of raising the output of manpower.

Geologists in the Coeur d'Alene

district are continually looking for the elusive answers to questions which aid in localizing development for ore deposits. Different areas within the district require different treatment, and experience dictates that there are no universal rules. As an example, it appears that theories applicable to the Silver Belt and perhaps to the East Silver Belt, cannot be applied to the Pine Creek area without considerable revision. Likewise, Canyon Creek relationships are not directly applicable to the Kellogg area.

With the exception of some locations in the Prichard argillite and the lower Burke formations, it is becoming more apparent from additional study, that most of the ore deposits in the Coeur d'Alene district have an intimate relationship with sericitized bleached rocks. These zones of alteration trend in long dimension with the major structural features, and are intimately associated with anticlinal folds and large fault structures. In this presentation discussion is restricted to the Silver Belt and its easterly extension, beginning just west of Big Creek and reaching easterly to the Idaho-Montana line, a distance approximating 18 miles. Structurally, the area lies between the great south-dipping normal Osburn fault on the north and the large south-dipping normal Placer Creek fault on the south. Between these large faults several linking fault structures exist. Some of them are of normal displacement and others like the Silver Summit fault, the Chester fault, and the Big Creek fault are overthrusts of considerable magnitude. Adjustment along major faults developed minor fractures in the included fault blocks providing openings for vein deposition.

Zone Extends Eastward

In the Silver Belt the Big Creek anticline roughly parallels the block included between the two large faults mentioned previously, and it has been traced easterly from Big Creek at least to Placer Creek south of Wallace. East of Placer Creek, in the East Silver Belt area, recent mapping confirms the presence of similar anticlinal structures in the easterly extension of the same fault block.

Throughout the length of this 18-mile section, bleached zones of variable width may be followed. Locally, the zones of bleaching pinch and swell, and occasionally cross prominent structures at a small angle, but in general these zones persist without important interruptions. Deep development work in the Sunshine, Polaris and Silver Summit mines indicates that near the surface the zones of bleaching are much wider than they are on lower levels. To bring the several aspects of the situation together into a workable idea, it appears that the sharply folded rocks crossed by deep-seated faults provided channelways, relief of pressure and the presence of more permeable openings nearer the surface allowed their wider diffusion resulting in the fan-like shape seen in cross-section.

Order of Mineralization

Near the easterly end of the zone, in the vicinity of the Atlas Mine, the earliest manifestation of the mineralization was the development of strong chloritized zones accompanied by considerable amounts of magnetite and specularite. These zones lie in the northerly one-half of the block and do not extend westerly more than three or four miles. The next effect of the mineralizing solutions appears to have been the bleaching and sericitization which has such a widespread occurrence. A large amount of the carbonate minerals with abundant pyrite are disseminated through the bleached zones and they appear to have accompanied the development of the sericite. Structural adjustments provided openings in the altered rocks along which carbonate and quartz veins were deposited. Considerable pyrite and perhaps some chalcopyrite and/or tetrahedrite accompanied this phase of the mineralization. These vein structures appear to be most abundant in the strongly altered areas. The last phase of mineralization, the one economically most important, appears to have followed some structural adjustment during which time the veins were re-opened to mineralization by solutions which deposited commercial amounts of silver, lead, zinc and copper accompanied by quartz.

Without putting the finger of geological hate on areas outside the bleached zones, recent experience would dictate that selection of areas of strong bleaching should be the first stage of prospecting for ore deposits in the area discussed. Zones containing abundant quartz and carbonate veins may be developed by shallow work and concentrated development of these areas by deeper work would then appear to be in order. Such work is certainly justified if silver, lead or zinc appear at shallow horizons. The Silver Summit development has sporadically followed this plan and the Hecla Mining Co., the parent company of Polaris, is currently applying the same procedure to the very large and promising Rock Creek area in the East Silver Belt more than 8 miles east of Silver Summit.

In deep development of promising veins, certain structural conditions appear to exert control on the localization of commercial oreshoots. Examples of better localities for ore might be listed as follows:

1. Promising veins where they cross folds or warps in the wall rock.
2. Warps in the veins both on the strike and dip. Examples are the Sunshine and Polaris veins where careful contouring by the writer indicates that oreshoots are best on the steeps below the flats and are likely to be localized on ridges in the plane of the vein.
3. Where veins approach prominent fault structures, as in the case of the Chester vein and the Silver Summit vein.
4. Where strong veins in unbleached or partially bleached rock enter zones of intense bleaching and alteration.

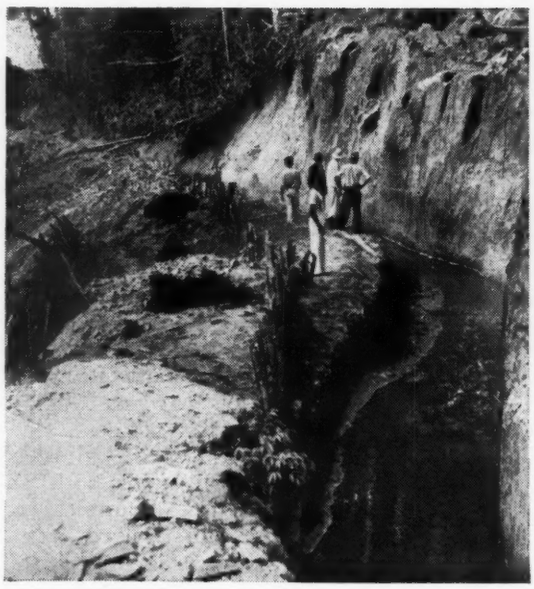
This list may be enlarged as development proceeds. Careful study of structural controls will provide the geologist with tools for finding these elusive deep-seated ore deposits so well protected by nature.

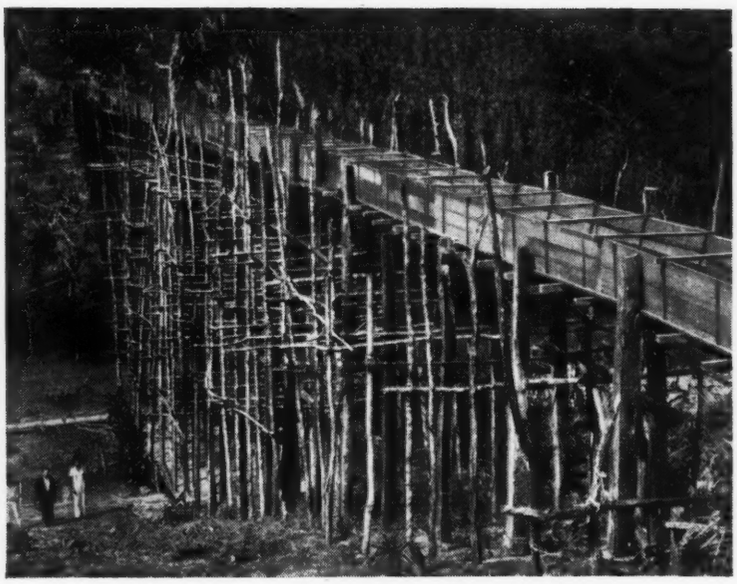
Recent Activities in Area

Silver Belt Area. As pointed out a year ago, many deep exploration programs are active in this section. Sunshine Mining Co. continued exploration of the Yankee Girl vein on the 3100 level and it is now driving a south crosscut on the 3700 level to explore this vein within areas partially owned by Metropolitan Mining Co. and by Sunshine Consolidated Mining Co. Also, the 3700 level west drift on the Silver Syndicate vein has been advanced during the year and Sunshine's annual report states that "the fault zone has now been explored for 563 ft. by drifting on the strike of the fault zone on the 3700 level, and this drifting has produced 5,194 tons of ore averaging 7.26% lead and 19.1 oz. silver per ton."

In addition to the Silver Summit development described more fully in this report, Coeur d'Alene Mines is driving a long south crosscut approximately at sea level to explore veins in several properties south of

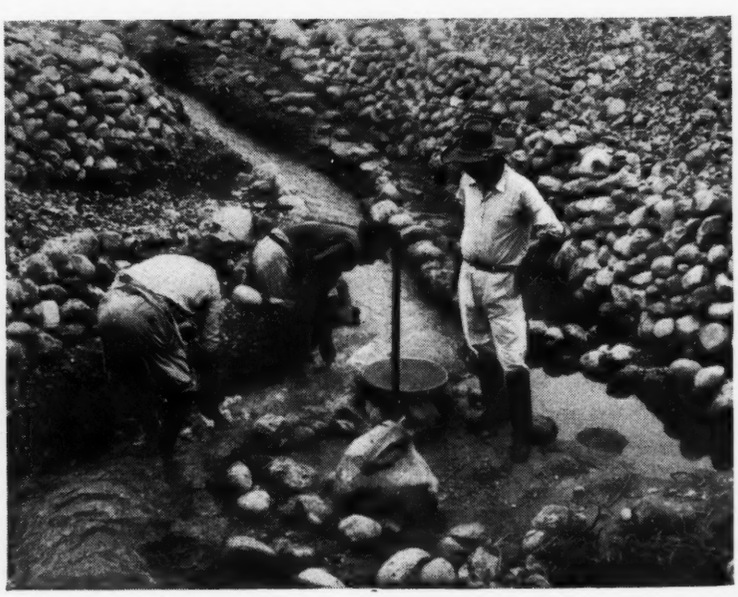
(*Concluded on Page* 151)





THE LAND OWNERS bring water to their diggings in ditches and flumes, some of which are noteworthy feats of engineering and construction.

THE DIAMONDIFEROUS gravels often cover considerable areas. Here is a view of a typical diggings. All work is with primitive hand tools.



AFTER REMOVAL of overburden and large sizes the gravel is dug, washed and panned to a crude concentrate of the smaller, heavier gravels.

SOMETIMES (left) gravels are taken from beds of modern streams. The concentrate is re-panned, and carefully picked over for diamonds.

Diamond Mining in Brazil

THE MOST IMPORTANT of Brazil's three diamond mining centers is in the State of Mato Grosso, far in the interior. About 30% of the country's output is of gem quality, the remainder being used by industry.

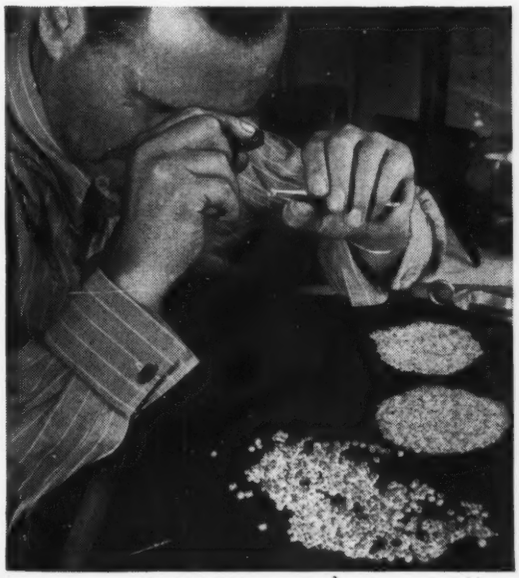
Mato Grosso diamonds are found in the region near Cuiaba, the State capital, which can be reached by air from Rio de Janeiro in a few hours. The overland trip, by railroad and river steamer, lasts three weeks.

The diamonds are sometimes in the beds of modern streams, but are mainly along ancient river channels, sometimes quite far from the present streams. Thus, water must often be brought some distance by ditches to reach the diggings. At the diggings diamonds are commonly in the lower seams of gravel, and the miners must strip up to four meters of overburden to reach the pay.

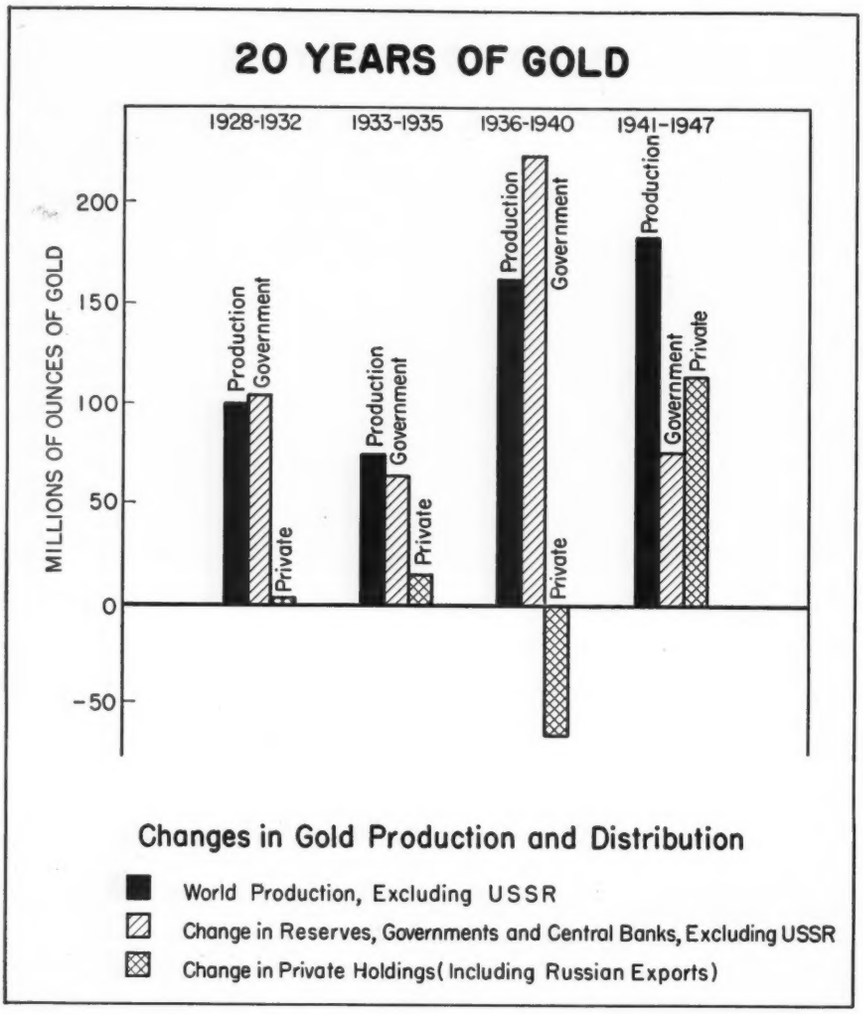
The garimpeiros (miners) are usually grubstaked by the land owners, who customarily also pay for bringing water to their diggings. Sometimes miners are tempted to abscond when they find valuable stones, but culprits are usually caught as, despite the wildness of the region, transportation is slow and hiding difficult.

The work of the garimpeiro is hard, and he stands all day under a hot sun in icy water. The life appeals to the rugged and adventurous. Living conditions are informal and crude. Usually when a miner finds a good stone, he throws a party, with liquor and fireworks, and is looking for a grubstake a few days later.

All Photos by Triangle Service



EXPERTS classify the stones. The miner spends most of his money in the general store, which sells anything from champagne to explosives.



Who Has The Gold?[1]

IRA B. JORALEMON
Consulting Geologist

GOLD HAS BEEN THE SYMBOL of wealth in all the civilizations that have arisen in the past 10,000 years. The Assyrians, the Egyptian dynasties, the ancient empires of India and China, Greece and Rome, the Incas and Aztecs and all the other peoples that have made a brave show on the pages of history have worshipped at the feet of the Golden Calf. In modern times the hopeless depreciation of paper currencies has turned men back to gold for security wherever governmental action has not made the holding of gold a crime. Throughout history men have toiled and fought for this beautiful and enduring metal. In all times and all places, gold has bought the things men most desire, from freedom from want to the might of kings and the favor of fair ladies.

In spite of the tremendous influence of gold on mankind, for good and for bad, all the gold that men have won from the earth in 10,000 years could be put in a room 48 x 40 x 20 ft. Less than a seventh of this gold has been destroyed or lost.

The permanence and beauty which have given gold such a hold on the imaginations of men should make it relatively easy to determine how much gold there is in the world, and who owns it. The gold can be put in vaults, and once there it stays. Nevertheless, gold statistics are hardly more than guesses. Estimates of production and of public and private holdings vary by many hundred millions, or even billions of dollars. Gold data should properly be expressed as estimates rather than statements of fact.

The figures for world production and distribution of gold in the tabulation that accompanies the present discussion are therefore rough approximations. While they are derived from reports of the American Bureau of Metal Statistics, the United States Bureau of Mines, the Federal Reserve Bulletin and other standard sources, these authorities often disagree with each other and even with themselves. Data in the table are recorded to the nearest hundred thousand ounces of gold, or the nearest hundred million dollars. Even these approximate figures give a false impression of accuracy. There may be far more serious errors. However, such errors will not invalidate the general answers to the question "Who Has the Gold?"

Four Major Movements

The data indicate a remarkable fluctuation in the rate of change in private holdings of gold and in reserves held by nations and central banks. The variations in production were notable, but not as great as those in distribution of gold. Within the past 20 years there have been four major swings which may be summarized as follows:

1. From 1928 to 1932 government reserves increased rapidly while privately owned gold increased by an insignificant amount.

2. From 1933 to 1935 there was a small increase in annual production. Government reserves increased at about the same rate as in the previous period, and private holdings increased at a much more rapid rate of four million ounces per year.

3. From 1936 to 1940 both production and government stocks increased by 36%, while private holdings decreased by the enormous amount of 48 million ounces.

4. Finally from 1941 to 1947 production decreased materially; government reserves increased only a quarter as fast as in the preceding period, and the amount of gold in private hands shot upward at the almost unbelievable rate of more than 16 million ounces per year.

The detailed figures for production and distribution of gold emphasize the changes from period to period.

[1] Delivered before the Idaho Mining Association at Sun Valley, June 1, 1948.

Gold Production

Production is the least uncertain of the chapters in the story of gold. About 35% of the world's output in normal times, exclusive of the USSR production, comes from South Africa, 15% from the United States and 13% from Canada. The rest is divided among many countries and all the continents, with no outstanding great producers. The data on production outside of Russia might be expected to be moderately accurate. This is true only if a liberal definition of accuracy is accepted. The published estimates by American authorities of production in the past eight years and an estimate made by the Foreign Exchange Control Board of Canada, which has not been published, differ by several hundred million dollars. This is a mere trifle in the sort of accounting that satisfies our fiscal authorities with respect to the theoretical base of our monetary system.

The most likely guess is that world production, exclusive of USSR, averaged about 25 million ounces per year from 1928 to 1932; 24 million from 1933 to 1935; 32 million from 1936 to 1940 and 26 million from 1941 to 1947.

When it comes to the USSR, so little is known of gold production that the imagination has free sway. The American Bureau of Metal Statistics emphasizes the uncertainty, but suggests the figures in the accompanying table with annual production of 1.8 million ounces from 1928 to 1933, and 4 to more than 5 million ounces since then. Less conservative authorities, particularly those who are most afraid of Russia, estimate the annual gold production of the USSR at several times this amount. The Canadian Mining Journal of October, 1947, quotes David J. Dallin and Boris Nicolaevsky as stating, in their book "Forced Labor in Soviet Russia," that recent Soviet production is 16 to 18 million ounces per year, or nearly half again as much as the South African output. This is probably one of many examples of the unreasoning fear that ascribes superhuman power to the Communists.

On the whole, it seems fairly safe to guess that a little more than 590 million ounces of gold have been recovered from the mines of the world in the past 20 years. Estimates by the United States Bureau of Mines indicate that the total gold output of the world from the time man first gleaned this noble metal from the stream beds of North Africa and Arabia through 1927 totaled in the neighborhood of 1,025 million ounces. The total amount of gold won from the earth from the dawn of history to the present is probably a little more than 1.6 billion ounces. At the present official price of $35 per ounce, this would be worth 56.6 billion dollars. This is the total to be accounted for in the answers to the question "Who Has the Gold?"

SUMMARY

(Gold Production and Changes In Gold Holdings)

(Millions of Fine Ounces)

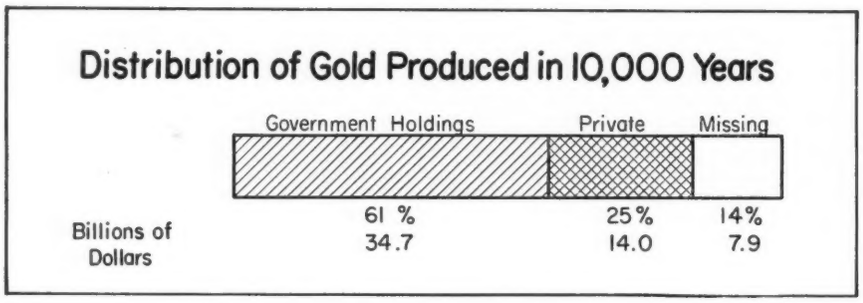
	1928-1932	1933-1935	1935-1940	1941-1947	1928-1947
I. World (excl. USSR) production	99.4	71.1	161.2	183.6	515.3
Gov't reserves and central banks at end.	559.0	618.8	843.1	917.8	917.8
Increase in period	103.0	59.8	224.3	74.7	461.8
Change in private Holdings					
Increase		11.3		109.0	53.6
Decrease	3.6		63.1		
Prob. indust. use	+6.0	— 2.0	+ 2.0	+25.5	+31.5
To priv. treas.	—9.6	+13.3	—65.1	+83.5	+22.1
II. USSR (Guess) Production	7.2	12.1	27.0	30.0	76.3
Gov't reserves at end.	17.8	25.0	37.0	73.5	73.5
Increase	13.1	7.2	12.0	36.5	68.8
Exports to U. S. and Brit.	?	. ?	10.8	3.0	
Prob. total	5.0	5.0	15.0	5.0	30.0
III. Total prob. increase in private gold holdings, incl. Russian exports	1.4	16.3	—48.1	114.0	83.6

IV. Total world gold production and its disposition	Million oz.	Million Dollars @ $35 per oz.
Est. world gold prod. before 1928	1,025.0	$35,900
Est. world prod., 1928-1947, incl. USSR	591.6	20,700
Total est. prod. to end of 1947	1,616.6	56,600
Monetary stocks, 1/1/48, incl. USSR	991.3	34,700
Industry and private treas. 1/1/48		
Before 1941	286.0	10,000
Added 1941-47	114.0	4,000
Total	400.0	14,000
Disappeared	225.3	7,900

Government Reserves

With all the monetary studies by agencies of the United Nations, by our Federal Reserve System and by other financial authorities, it seems reasonable to expect a moderately accurate estimate of the official gold reserves of nations and their central banks, outside of Russia. Such an expectation is sadly at variance with the published figures. The uncertainty is illustrated by estimates given on two different pages of the Federal Reserve Bulletin for April, 1948. Reserves of the United States, Russia, United Kingdom and Canada are excluded from the comparison, as they are not given in both estimates. Reserves of other nations and central banks at the end of 1947, as given on page 376 of the Bulletin, total $7,987,000,000; and on page 464 they total $6,976,000,000.

The Director of the Division of Research and Statistics of the Federal Reserve System, in a letter to the writer of the present article, states that the discrepancies result primarily from ineradicable deficiencies of the regularly reported data. In the case of some countries. various government agencies hold more gold than is included in the regular reports. Such holdings are considered confidential, and are not



Gold Balance Sheet

DEBIT	
Gold produced in 10,000 years before 1928	$35,900,000,000
Gold produced, 1928 to 1947	20,700,000,000
TOTAL	$56,600,000,000
CREDIT	
Gold reserves of nations and central banks	34,700,000,000
Private holdings, including ornaments and industry	14,000,000,000
Gold that has disappeared in 10,000 yrs. of wear and loss	7,900,000,000
TOTAL	$56,600,000,000

available save for the purpose of obtaining total figures for special studies such as that involved in the article that includes the table on page 376 of the April issue of the Bulletin. The discrepancy illustrates the difficulty of obtaining satisfactory statistics of gold reserves. It seems likely that the regular tabulated figures that are repeated or brought up to date from month to month in the Bulletin will show changes in reserves more accurately than the much larger figures given in the special article on earlier pages of the April issue.

The regular month to month statistics, which are summarized in the accompanying table, show that gold reserves of governments and central banks of all countries except Russia have fluctuated wildly from period to period. At the beginning of 1928 the total of these reserves was 456 million ounces, of which the United States held 42%. In the next 5 years the world reserves, again exclusive of Russia, had increased to 559 million ounces, of which the United States held 35%. By the end of 1935 the reserves had risen to 619 million ounces, and the proportion owned by the United States was 47% of the total. United States Government holdings increased in these three years by 94.5 million ounces, largely because of the forced delivery of privately owned gold to the Government, while national reserves in the rest of the world decreased by 35 million ounces.

In the 5 years from 1936 to 1940, the flood of gold that was sent to the United States, for security and in payment for war materials, increased our holdings to 630 million ounces, which amounted to 75% of the total government reserves outside of Russia of 843 million ounces. After 1940 the trend was reversed again, due largely to Lend-Lease and to gold payments by the United States to South American and other countries for war materials. From 1941 through 1947 our gold reserves increased by only 25 million ounces, while reserves of other countries and their central banks, excluding Russia, increased by nearly 50 million ounces. At the end of 1947 the United States held 71.4% of the ex-Russia world governmental reserves of 917.8 million ounces.

Russian Stocks Estimated

The proportion of world reserves held by the United States was much smaller at the end of 1946, than at the end of 1947. In 1946 our holdings were only 64% of the total. The reversal of flow of gold in 1947 has been of too short a duration to prove that another major swing in the trend is in progress.

Gold reserves of the USSR have not been included in the comparisons, because they are as little known as Soviet production. The Federal Reserve Bulletin estimates Russian reserves at the end of 1947 as $2,750,000,000. This seems reasonable in view of the known exports and the more conservative guesses as to production. Some students of Russian affairs think the Soviet reserves are many times as great. Dr. Charles Prince, in an article in the "United Nations World" for December, 1947, estimates that Russian reserves total 17 billion dollars. Some suggest that this stupendous reserve is being accumulated for a final assault on capitalistic economy. This seems fantastic.

Russian reserves in earlier years are perhaps a little less uncertain, as production could be estimated more accurately during the time when American mining engineers were helping the Soviet Government.

The Russian Government certainly has a lot of gold. It is probably adding to its reserve a fairly regular increment of 3 or 4 million ounces per year. This is remarkable in a country that scorns capitalism and all its ways.

Including the most likely estimate for Russia, gold stocks of all nations and central banks at the end of 1947 totaled about 991.3 million ounces, worth at $35 per ounce, 34.7 billion dollars. The United States owned 67% of the total.

Private Treasures

The amount of gold in private hands, in coins, bullion, jewelry and industrial use, can only be guessed. It is pretty well established by a comparison of production with changes in government stocks that there has been an ebb and flow, backward and forward between government reserves and private holdings. Governmental action and economic conditions have determined the direction of flow. The four changing trends in private holdings in the past 20 years correspond with those noted in the discussion of governmental reserves.

From 1928 to 1932, inclusive while government stocks outside of Russia increased by 103 million ounces, private holdings increased by only 1.4 million ounces. The great depression evidently forced many to turn in their privately held gold in order to meet acute business or personal needs.

From 1933 to 1935 inclusive, private holdings of gold increased by 16.3 million ounces. As the requisition of privately held gold in the United States took place in 1934, it is evident that private holdings in other parts of the world increased greatly to make up for the decrease in this country. Wherever it was legal to own gold, men put their surplus reserves in it, as the safest investment in a time of economic and political uncertainty.

From 1936 to 1940, inclusive, production was at a much higher level, because of the increased price of gold. Nevertheless, private holdings decreased by 48.1 million ounces. Governmental action and the threat and beginning of the world war caused individuals and banks to turn their gold in to government treasuries and central banks, with the result that government stocks increased by nearly 45 million ounces per year.

Gold Eagerly Sought

In the final period, from 1941 to 1947 inclusive private holdings increased by 114 million ounces. This was more than half of the total world production. Evidently lack of faith in printed currency or in government promises to pay caused a wholesale investment in gold during and after the war, wherever laws made this possible. This trend still continues, as shown by recent sales of millions of ounces of gold to dealers in Macao and elsewhere in the Orient.

Combining the four periods in the 20 years from 1928 to 1947, private holdings of gold have increased by about 83.6 million ounces, or 15% of world production. The rest of the gold output has gone into reserves of governments or central banks.

Converting the ounces to dollars at the official price of $35 per ounce rather than at the unrestricted price of $40 or more, in the 13 years from 1928 through 1940 a billion dollars worth of gold was transferred from private to public reserves. In the 7 years from 1941 through 1947 the trend was reversed, and private holdings increased by nearly 4 billion dollars. This is a startling answer to the claim by theoretical economists that men no longer value gold.

Industry's Share Unknown

An attempt to divide the privately held gold into bullion or coin and gold that has gone into industrial use or jewelry seems almost hopeless. A great part of the gold used in industry comes from melted down coins, or from gold recovered from earlier industrial use. For instance dentists recover about as much gold from old fillings as they use in new ones, though the patients are not credited with the recovered gold. Even gold that accompanies the dead on their last journey is seldom lost. The treasures buried with Egyptian kings were usually stolen later by despoilers of the tombs, and it is said that the gold fillings or jewels of the modern dead seldom get to the grave or the funeral urn. These unrecorded transactions help to obscure the estimates of new gold used by industry.

The United States Bureau of Mines Year Books record the approximate amount of reclaimed and new gold used by industry, including the manufacture of ornaments, in the United States. The figures show that from 1928 to 1932 industry used 3.2 million ounces of new gold in addition to the reclaimed gold. From 1933 to 1935 the amount of reclaimed gold turned in to the mints — it seems disrespectful to call it scrap gold — exceeded all gold actually used by industries by 3 million ounces. The "new gold" used by industry was therefore a minus figure. In the 5 years from 1936 through 1940 industries used 600,000 ounces of new gold in addition to the reclaimed gold; and from 1941 to 1947 United States industrial use totaled more than 19 million ounces of new gold in addition to the gold recovered from scrapped articles. The figures certainly suggest that in the past 7 years fear of inflation has caused many in the United States to invest in gold ornaments or jewelry, as they cannot legally own bullion or coin.

In the rest of the world there are no figures for industrial use that seem to have much validity. In many areas, as in India, wealth has always been stored in jewelry as well as in coins or bullion. As most of the gold used in jewelry or industry eventually comes back to monetary stocks or bullion, in the long run all the gold that is not held by governments or central banks can be considered as part of the present or past private treasures.

The total amount of gold in private hands is anyone's guess. It is perfectly safe to let one's imagination run wild, as there is no possible check on the figures. The greatest private treasures are those held by the Indian princes, and they aren't telling how rich they are. Edgar Snow, in his book "People on Our Side," states that the Nizam of Hyderabad alone has 250 million dollars in gold bullion and 2 billion more in coin and precious stones. Other Indian fortunes are not quite as astronomical. The total gold in private hands in India in 1928 was estimated by the World Almanac as 75 million ounces, now worth 2.5 billion dollars. The French peasants and merchants have for many years kept a large part of their savings in gold. Guesses as to the amount of the French private treasures vary from 3 to 5 billion dollars. In all other parts of the world where government action has not made it a felony to own gold, many men have kept part of their fortunes invested in this enduring metal. Sometimes they accumulate gold coin or bullion, and sometimes ornaments or jewelry that can be converted into currency when needed. Even in the United States, when safe deposit boxes are opened after the death of elderly individualists, it is not uncommon to find hidden treasures of thousands or tens of thousands of dollars worth of gold coins. Everywhere men try to protect their future by holding gold that will surely not decrease in value rather than paper currency or securities that in the past have lost most of their purchasing power through inflation.

As a rough guess, it seems likely that in 1940 the total amount of gold held by individuals and privately owned companies everywhere in the world was at least 290 million ounces, worth 10 billion dollars. Adding the 114 million ounces of gold that has gone into private holdings in the past 7 years, the gold now in private hands must total at least 400 million ounces, or 14 billion dollars.

The Balance Sheet

From all these dubious statistics it is possible to construct a balance sheet for gold that is probably the most inaccurate balance sheet ever attempted. All figures are at $35 per ounce, which adds one more inaccuracy to the accounting.

Changing the dollars to percentages, nations and central banks now hold 61% of all the gold that men have seen. Individuals or corporations own 25%, and only 14% has disappeared in the 10,000 years.

No other human possession in all time has been so zealously and effectively guarded.

Who has the gold? We in America have most of it, through our share in the great Government reserves or in gold ornaments. Outside the United States those who can afford to own gold hold it as a favorite method of insurance against future want. Throughout the ages, man's faith in gold has never wavered, and gold has never failed him. Men cannot eat gold, but those who have had gold have never gone hungry.

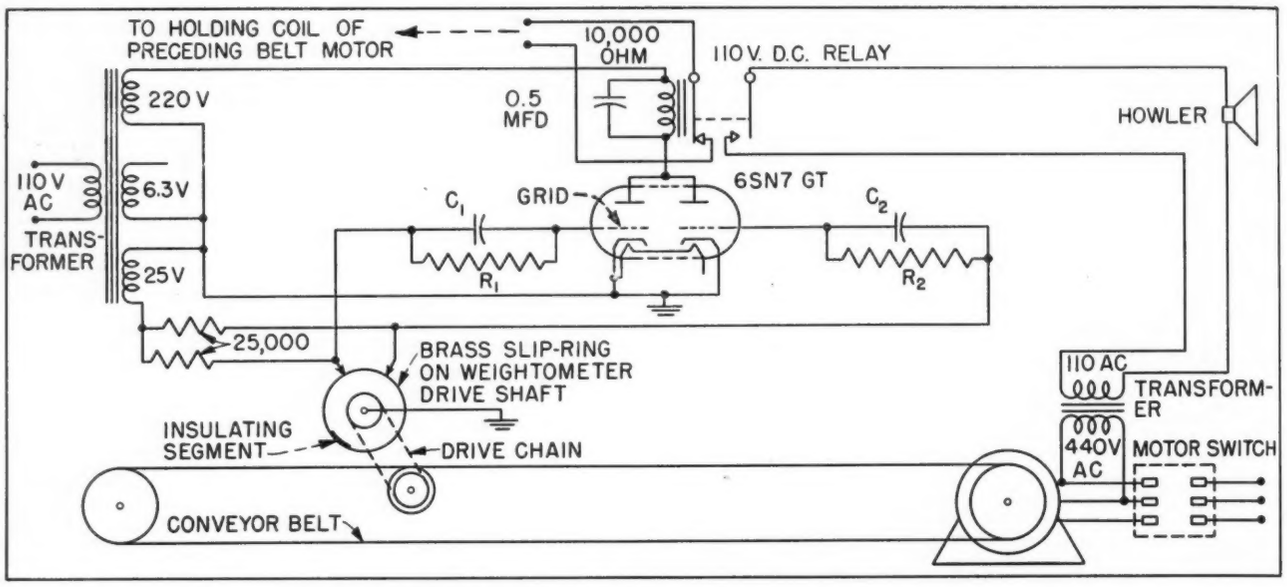


FIG. 1. THIS UNIT SOUNDS A HORN when the Weightometer drive shaft stops rotating.

Electronic Rotating Indicator

C. M. MARQUARDT
Electronic Engineer
Combined Metals Reduction Co.
Salt Lake City, Utah

To PROVIDE a constant and automatic check on the operation of a Weightometer in the mill of Combined Metals Reduction Co. at Pioche, Nev., the electronic device here described was developed. The immediate cause was the breaking of the chain drive connecting the conveyor-belt idler with the drive of the weighing machine. This remained undetected for some time because the chain is enclosed in a guard and not visible to the operator. Inasmuch as the ore treated is bought on the basis of the weighing it gets here, it is apparent that some dependable means of warning when the chain fails was needed.

To be effective, the device had to be one that would check itself constantly and give a warning signal on failure. Operating conditions were dusty, so it was desirable to have as few moving parts as possible. Also, it was decided that suitable protection would be provided if the device were attached to the Weightometer shaft. Any stoppage of this while the belt was running would instantly sound the warning.

The device as constructed consists essentially of an electronic timer circuit set at a point where the timer never completes its timing cycle so long as the shaft is turning, and a brass slip-ring, or commutator, mounted on the Weightometer shaft, into which ring is set an insulating segment. Two brushes ride on the ring.

In studying the operation of the warning device, first consider the action with only one brush on the slip-ring. A suitable 10,000-ohm, 110-v., d.c. relay in series with the 220-v. transformer secondary is placed in the plate circuit of one section of a 6SN7 triode vacuum tube. When the grid bias voltage of this section of the tube is at or near zero volts, the plate is permitted to pass current from the transformer through the relay coil on each positive half cycle, thereby energizing the relay. The capacitor in parallel with the relay coil serves to smooth out the half-cycle pulsations, eliminating chatter in the relay. When the grid of this section of the tube is biased negatively 6 v. or more, the tube no longer passes current in the plate circuit and the relay is deenergized.

It is seen from the circuit that the 25-v. transformer secondary is shorted to ground through a 25,000-ohm resistor when the brush is on the metal of the slip-ring, and in turn is applied to the grid of the tube when the brush is on the insulating segment of the slip-ring. The 220-v. secondary and the 25-v. secondary are connected in phase opposition so that when the plate of the tube is driven positive the grid is driven negative. Therefore, when the brush is on the insulating segment the tube is prevented from conducting because of this action. However, when the plate of the tube is negative the grid is positive, and the grid will pass some current charging condenser C_1. As the cycle is reversed, condenser C_1 can only discharge through resistor R_1 in size so large that the condenser loses but very little charge on the reverse cycle. The condenser is again charged on the next one-half cycle. In a matter of two or three cycles, the condenser is charged to the peak of the voltage on the 25-v. secondary, or about 35v.

When the brush leaves the insulating segment and is connected to the metal of the slip-ring, the 25-v. secondary of the transformer is grounded out, and condenser C_1 is not recharged. It slowly loses its charge through the resistor R_1. The grid thus is kept negatively charged by the capacitor until the charge leaks off through resistor R_1. The charge would leak off capacitor C_1 if the shaft stopped rotating, and the relay would be energized sounding the warning. However, as long as the shaft is turning the brush will pass over the insulating segment before C_1 has had time to discharge completely, and C_1 again will be charged to peak voltage as the brush

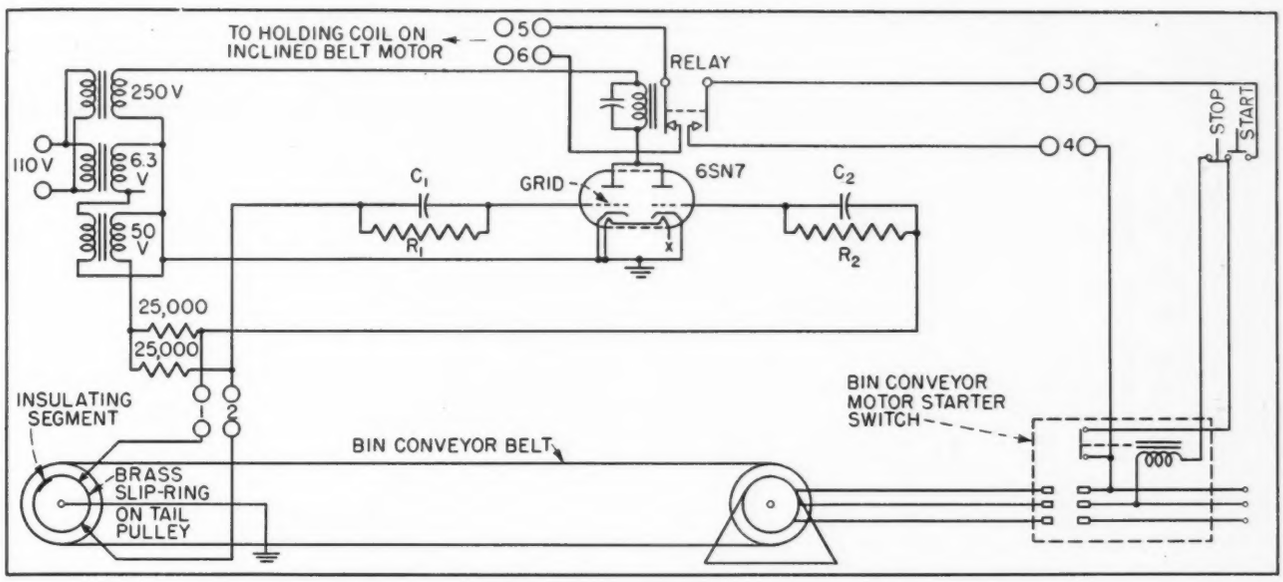


FIG. 2. THIS UNIT STOPS THE DRIVE MOTOR of the bin conveyor belt if the belt breaks.

and Belt Protector for Mills

passes over the insulating segment.

There is always the possibility that the shaft will stop rotating at a time when the brush is on the insulating segment. If this happens, the relay will not be energized as the grid remains at a high negative charge. To obviate this possibility, a second brush is connected to the other section of the twin triode vacuum tube. The plates and cathodes of the two tube sections are connected in parallel. Arrangement of the brushes is such that both cannot contact the insulating segment at the same time and as a consequence there are no "blind spots."

The timing cycle depends only on the values C_1, R_1, and C_2, R_2, which are made respectively equal. For a fast moving shaft C_1 and R_1 are both made small, while larger units are used on a slow turning shaft. For the shaft in the installation described running at 75 r.p.m., C_1 was chosen at 0.1 MFD and R_1 at 5 megohms.

The timer supply current is taken from the lighting circuit, while the howler or siren is connected through a transformer on one phase of the motor power circuit. The transformer is installed between the motor and its line starter switch. As a consequence, the warning device is turned on with the lights and is always ready for operation. While the relay is energized when the shaft is not turning, there is no power on the transformer serving the howler unit. When the motor driving the conveyor belt is started the howler is energized until both brushes have passed over the insulating segment. The device thus checks itself for operation each time the belt is started. After 18 months of continuous service the device has required no service whatsoever.

Electronic Belt Protector

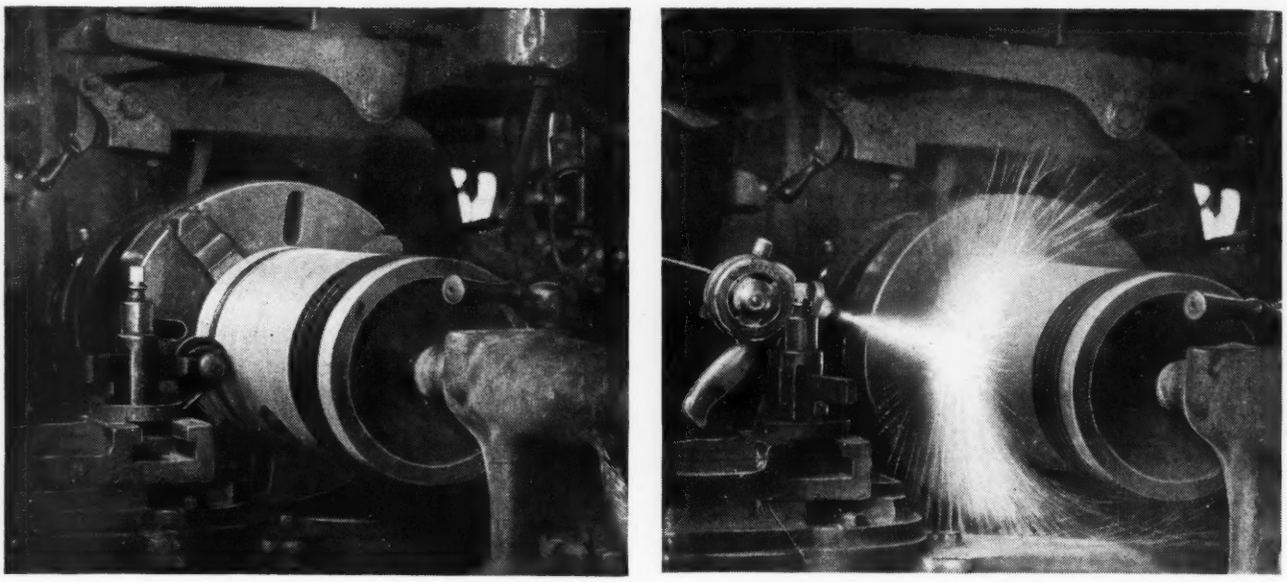
The electronic conveyor belt protector is essentially the same as the electronic shaft rotation indicator. As it was not desirable to install a howler as was done in the case of the shaft rotation indicator installed on the Weightometer, the conveyor-belt protector is connected as shown in Fig. 2. Terminals 5 and 6, which are accessible upon removing the base of the instrument, are connected in series with the holding coil of the motor driving the inclined conveyor belt. Terminals 3 and 4 are connected in series with the starter button on the push-button station for the motor driving the distributor belt over the bins. Terminals 1 and 2 are connected to the commutator brushes on the tail pulley of the distributor belt over the bins.

The apparatus is operated from the 110-v., a.c. supply and should be connected to the light circuit so that when the lights are turned off the whole apparatus is shut down.

When the distributor belt is shut down this apparatus will actuate just as though the distributor belt were broken. However, instead of sounding a howler it will close the circuit in series with the "start" portion of the push button connected to the motor on the distributor belt. It will also open the circuit leading to the motor on the inclined conveyor belt. Thus it will not be possible to start the inclined conveyor but it will be possible to start the distributor belt. Once the distributor belt has been started it will de-energize the relay in the electronic protective device, thus closing the circuit in the inclined conveyor belt motor allowing it to start.

If the belt should break, the motor on the distributor belt would not be affected, but the relay in the electronic protective device would be energized causing the inclined conveyor-belt motor to stop after three seconds of elapsed time. The inclined conveyor-belt motor cannot be re-started until the belt has been repaired.

If the tube in the electronic protective device should burn out, then when the distributor belt is shut down the relay would not be energized and it would not be possible to start the distributor belt. As this belt cannot be started, the inclined belt cannot be started. Since its installation, the belt protector has also performed satisfactorily.



SURFACE OF WORN PISTON is grooved on lathe before 1/8-in. metal coating is sprayed on. Then piston is machined to size.

How Metallizing Solves Mine

RICK MANSELL
B. Sc., A.R.C.Sc., A.I.C.
Process Engineer
Los Angeles, Calif.

METAL SPRAYING plays a vital part in the maintenance of mining machinery and equipment. It is used to recondition all types of worn shafts, pump rods and valve stems. For press fits, No. 10 carbon steel is used; for the shafts which operate in plain (bronze) bearings, Tufton or stainless steel is used; while on pump rods and valve stems, the Tufton bronze is selected.

The depth or thickness of build-up is determined by the requirements of each part. For press fits, the shaft size is reduced 1/32 in. before rough threading. Shafts that are badly worn are built up as much as 3/8 in. The cost of repair may be 40 to 60% less than for welding.

Armature shafts can often be built up and machined without removing them from the armature core. Another advantage is that insufficient heat is generated to damage the winding or to warp the shaft. A shaft metallized and finished to size, provides a surface as good as new, at a fraction of the replacement cost. Surfaces wear longer and require less oil in lubrication. While stainless steel shafts in mine pumps cannot be built up with an electric arc welder, this operation is being successfully handled by spraying stainless steel, which is resistant to the acid water in mine pumps.

Locomotive axles which are repaired by other methods tend to break off, because of internal stresses that are set up; whereas axles which are renewed by building up slightly oversize by spraying and then dressing down to exact original dimensions of the shaft at the journals, prove to be durable.

Shafts and axles are built up with .25 carbon steel. Centrifugal pump casings are sprayed with lead. Pump sleeves and the sealing rings are built up with stainless steel or with Tufton bronze. Pump casings are sprayed on the inside with bronze. Electric motor collector rings are built up by spraying copper. Locomotive pistons are reclaimed wtih .25 carbon steel or with Tufton steel.

Exhaust fans 8 ft. in diameter, with fan blades 18 in. wide, were badly pitted as a result of abrasive dust erosion. Some of these fans were ragged at the edges, while others were abraded by metallic dust currents which pitted the blades longitudinally through their center portions. Pitted areas were metallized with .80 carbon steel. Holes were backed with thin sheets bolted in place, as were all jagged edges. The spraying was done over the worn areas, holes and plates—the latter being left permanently in place.

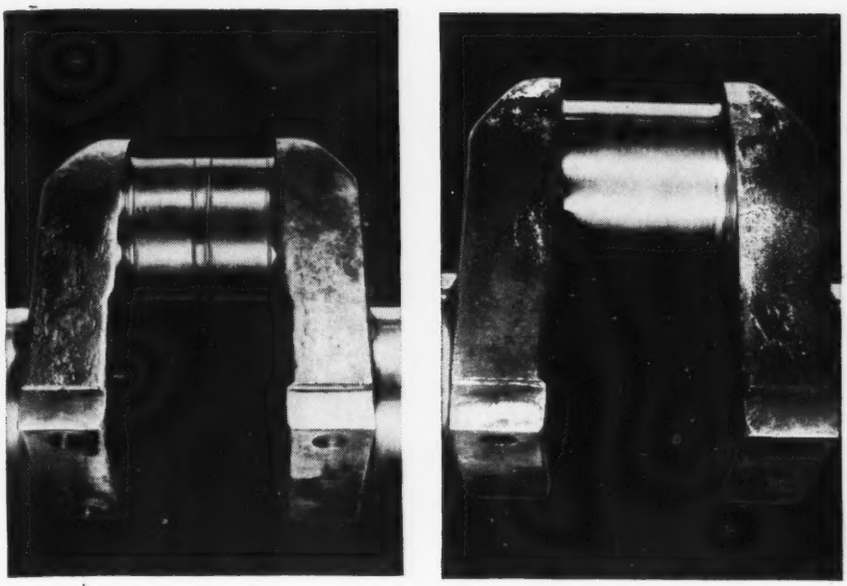
In 1937, a coal company metallized 2,300 mine cars with .015 inches of zinc to prevent corrosion by acid mine water. Recent examination indicated that many of them were still in a serviceable condition. In the absence of zinc protection, these mine cars would have to be discarded after four years use. Switch boxes and other electrical equipment used underground have also been sprayed with a protective coating of zinc.

The present widespread use of metal spraying has been the result of improved spraying practices and procedures. Spraying costs have been reduced and the quality of the deposited metal has been improved. Spraying equipment today is virtually automatic in operation.

The trade name of "Metallizing" has been given to the process of metal spraying. It has been competitively used in the place of other processes; among which are tinning, galvanizing, calorizing, electroplating and welding. Its main advantage is its portability. By means of metallizing it is possible to apply unusual thicknesses of metal coatings; in addition, there is no danger of distortion due to heat or to a resultant loss of strength properties of the base material being coated.

Preparing the Surface

There are three main methods of preparing a surface for metallizing: **Grit blasting, rough threading** and **electric bonding.** The method selected will depend upon the size and shape of the part to be metallized, and upon available facilities.



WORN ROD JOURNAL on crankshaft before and after metallizing and grinding.

Maintenance Problems

Grit blasting is generally used for preparing flat surfaces and for large irregular shaped parts. A No. 15 or No. 20 angular steel grit impelled by 80 to 100 lb. of air pressure will assure sufficient roughness for a satisfactory bond. The abrasive must be sharp in order to produce the tearing action necessary to form the sort of surface which will grasp the little particles of sprayed metal and hold them tightly. The steel grit should be air-cleaned frequently to remove the dust and fines which may remain embedded in the surface of the metal.

When working on flat surfaces, it is not recommended that more than .018 in. of aluminum, nor more than .020 in. of lead, tin, zinc, or steel be used. If such a flat surface requires a heavier build up than the figure specified, then additional anchorage must be furnished by some such means as spot welding, drilling or tapping.

Rough threading is the accepted method for the preparation of machine elements and small circular parts that may be mounted and rotated in a lathe. In this method the tool is set so as to tear the surface, rather than cut a clean thread. This tearing action of the tool provides thousands of small surface irregularities around which the spray metal can impinge and thus bond firmly.

It is important that the thread have well torn sides with many fissures, so that when the metal particles strike the shaft, they can lock into the many tiny hooks thus created. The successful use of the threading method requires proper dressing of the cutting tool and the correct selection of the number of threads per inch. This selection will depend upon the base and the diameter of the piece.

Electric bonding is comparatively new in application, but it may supplant both grit blasting and rough threading in many jobs. The tool used is similar to an ordinary arc welding torch. A nickel-iron electrode is rubbed across the surface to be sprayed. Small particles of the electrode are fused into the surface and produce a roughened crater-like effect; this provides many small irregularities to which the subsequently applied metal coating can adhere. Heat generated by the electric bonding process is dissipated rapidly and does not effect the temper of the part.

Objects to be metallized must be clean. For instance, a cast-iron piece which has been running in oil will contain absorbed oil in the pores of the metal. This oil will prevent the creation of a satisfactory bond, and neither rough threading nor grit blasting will remove it. Such parts should, therefore, be heated to drive off the oil.

For those hardened surfaces which tend to make machining operations difficult, it is suggested that the parts be first annealed. If the sprayed coating is composed of Tufton chrome steel, 1.20 carbon steel, or a No. 2 stainless steel, then it will not be necessary to follow by a rehardening operation, since these metals themselves provide a hard, tough surface.

Occasionally special bonding methods are employed. A shaft or a flat surface is first cold tinned before the application of spray-on tin, lead, zinc or bronze coatings. Air chippers have been successfully employed to prepare a flat surface to receive sprayed steel.

The Metallizing Operation

Metal spraying should follow surface preparation as soon as possible to prevent surface oxidation. Contamination by oil, grease, or other foreign metals must also be prevented as they will reduce the effective bond strength of the sprayed metal.

The operation is fairly simple. A continuous wire of the desired composition is fed into the rear of the metallizing gun. It is propelled forward toward the nozzle of the gun by compressed-air-actuated turbines. As the wire emerges from the gun nozzle, it is melted by an oxy-gas flame. This molten metal is then atomized by compressed air and projected against the surface. When it contacts this surface it cools instantly, and then adheres firmly to the prepared anchorage points.

The metallizing gun is a small device, consisting of a power unit and a combustion unit joined in a single assembly. The power unit consists of an aluminum housing; this encloses a high-speed air turbine attached to a gear reduction which runs in a bath of fluid grease. Connected to the reduction gearing are small rolls which feed the wire during the spraying operation. The combustion unit is composed of the gas head, simultaneous control valve, wire nozzle and air cap. In addition, there is a turbine regulating screw which controls the speed of the wire as it is conducted through the gun.

The wire is fed through the power unit at a uniform speed into the combustion chamber. When it reaches the apex of the oxy-gas flame, it is melted instantly. A concentric air blast projects the molten metal at a high velocity against the surface and helps to form a strong coherent coating. As metallizing is a continuous operation, the coating can be built up to any predetermined thickness.

The most powerful section of the heavy duty metallizing gun is the balanced turbine; this pulls the wire through the gun at a steady uni-

form speed. (To maintain this uniformity, the fluctuations in the compressor are equalized). One turn of the feed-roll yoke-screw exerts a 15-lb. pressure on the wire. The nozzle of the gun can be selected to handle any metals in their wire form, from 20-gage to ⅛ in. in diameter. Furthermore, the air cap of the gun can be adjusted to produce a more condensed spray with finer atomization.

For the purpose of melting the metal wire, various gases can be used admixed with the oxygen. Among these are acetylene, propane, butane, coal gas, hydrogen, natural gas or manufactured gases. With acetylene, the recommended pressure is from 7 to 15 lb., and this consumes 20 to 34 cu. ft. per hr., while the oxygen consumption is 60 to 80 cu. ft. per hr. With manufactured gas, the consumption is 65 cu. ft. per hr., while oxygen is consumed at the rate of 80 to 90 cu. ft. per hr.

It has been found that propane is a favored gas. The recommended pressure for this gas is from 10 to 15 lb., and the consumption of it is 2 to 2½ lb. per hr.; the oxygen consumption is 60 to 80 cu. ft. per hr. The propane gas is usually delivered in 100-lb. bottles, and, thus, each one provides 30 to 50 hours of spraying time.

The flame of the metallizing gun should be neutral. An oxidizing flame will result in the inclusion of oxides in the sprayed coating; these will cause an increase in the porosity and a reduction of the bonding strength. On the other hand, a reducing flame will result in a poor melt of the wire and inferior atomization which will result in an uneven coating.

Applying the Metal

Spraying may be done with a hand-held metallizing gun, or by mounting the gun rigidly on a lathe bed and turning the work past the gun nozzle. Flat surfaces and parts too large for mounting in a lathe are coated by hand. The nozzle of the gun should be held from 6 to 8 in. from the surface being coated, and should be kept in constant motion so as to prevent overheating of local areas.

The effect of the hot sprayed metal should never be such as to increase the temperature of the part above 200 deg. F. The existence of higher temperatures indicate that the gun nozzle is being held too close to the work or being moved too slowly. The danger of warpage or loss of metal temper can be eliminated by trying to maintain temperatures below this maximum.

An operator should experiment on test panels to ascertain the quality of the work he is performing. This will reduce the possibility of having to reblast and rethread parts which have been covered by inferior coatings. The application of a desired coating thickness is a matter of experience. Test panels are built up with the coating and the number of gun passes required are thereby determined.

An ordinary micrometer can be used to check thicknesses on the test panels. On the sprayed work, the coating thickness can be checked with a calibrated electric thickness gage, and the light sections are spotted quickly and are then brought up to the proper thickness so as to ensure a uniform coating.

It is recommended that the thicknes of the sprayed metal coating after finishing should be at least 1/32 in. When the part is worn less than this amount it will be necessary to machine away enough base metal to permit this minimum application. When rough threading is used for the surface preparation, this minimum 1/32-in. coating should be maintained above the apex of the thread. All parts of the surface should be built up beyond finished tolerances; and thus allow enough metal to be removed to produce a smooth machined finish during finishing operations.

The last stage in the metallizing process is the finishing operation, and this will depend on the type of metal sprayed on. Softer metals and low-carbon steels are finished in a lathe using the ordinary cutting tools. High-carbon and stainless steels must be finished by surface grinding. All usual sprayed metals can be machined without much trouble, but high-carbon steel coatings are so hard that it is almost impossible to tool them, and hence these are finished by a wet grinding operation. Cutting tools used for the sprayed metal are similar to tools used to machine cast iron.

For wear resistant coatings, Tufton steel or 1.20 carbon steel is recommended. Where severe corrosion conditions are encountered, No. 1 stainless steel (18-8) is used; this must be polished after spraying. For general atmospheric and cold water corrosion on steel, high purity zinc is used. For the protection of metals exposed to elevated temperatures, the aluminizing process is used.

Quite often it is desirable to improve a cold-rolled shaft by spraying stainless steel. On the other hand a high-carbon steel is sprayed on a lower carbon steel to give better wear resistance. Swedish iron is recommended for the salvaging of castings, since it has a similar surface appearance and is readily machinable. Where finish machining is desirable, as in the build-up of journals, bearing surfaces and for press fit work, a .10 to .25 carbon steel is selected. These are readily machinable and yield excellent wearing surfaces.

For pump rods, plungers, crank shafts, and for all surfaces requiring an extremely tough wear resistant coating, Tufton chrome steel can be used.

Porosity Is an Advantage

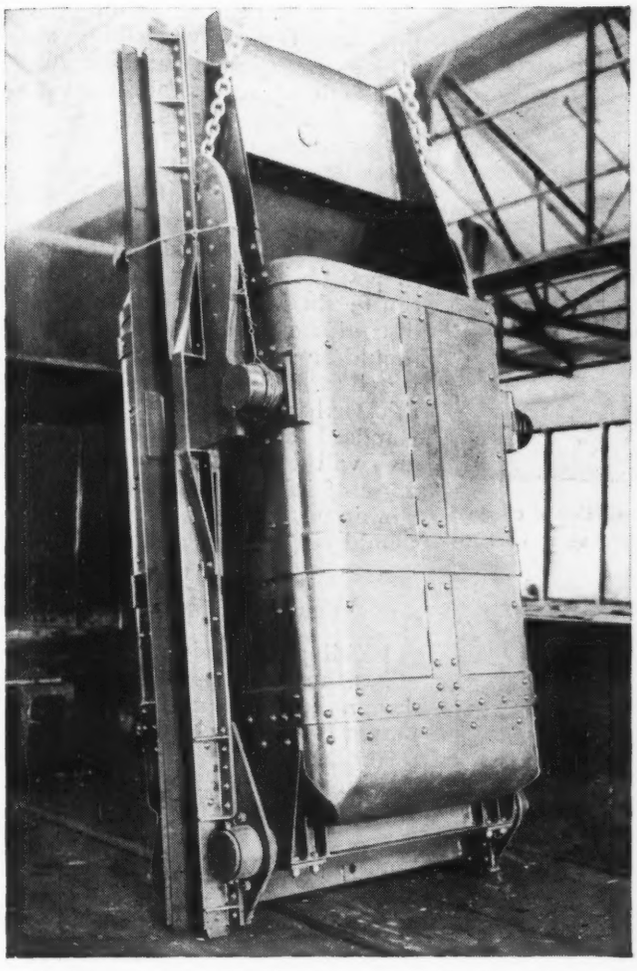
Wearing qualities of sprayed metal are dependent upon its porosity. This property enables it to absorb a certain amount of oil and provides the maximum lubricating properties both when the wearing surface is in motion and when starting with a static load. However, it must be noted that *sprayed metal must never be subjected to a tensile strain* during its service. This is due to the metallurgical characteristics of the sprayed metal as well as to the fact that it is bonded in a mechanical fashion rather than by fusion. The main property of the sprayed metal is its high compressive strength.

Metallizing is generally a rapid process requiring only one set-up in the lathe; the shaft is under-cut, metallized and machined in sequence. A metallizing gun will apply steel at the rate of about 10 lb. per hr. while an electric welder can only apply 5 lb. per hr. A 1/32-in. excess coating is all that is necessary to allow for machining in the case of metallizing operations, while with welding generally requires about ¼-in. oversize.

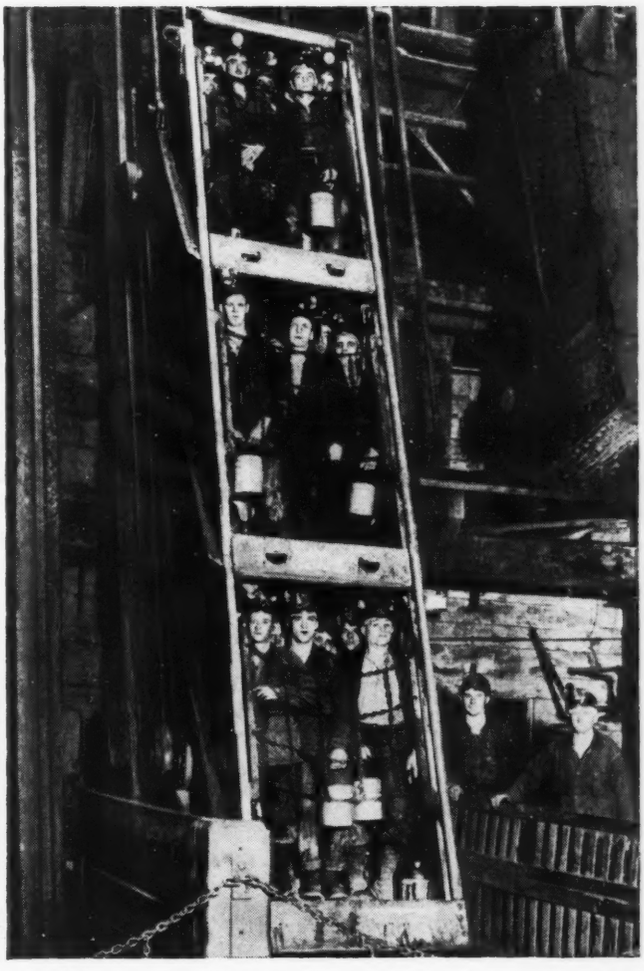
Advantages of spraying may be summarized as follows:

1. Surfaces being metallized do not become heated to a degree where warpage, crystallization or heat stresses occur.
2. Metals applied are in wire form and can be handled with ease.
3. Dissimilar metals can be bonded readily.
4. Many jobs can be performed while parts are in place.

Illustrations for this article were supplied through courtesy of Metallizing Engineering Co., Inc., Long Island City, N. Y.



SUBSTITUTION OF ALUMINUM for steel in this skip, built by Lake Shore Engineering Co., Marquette, Mich., saved 25% in weight.



USE OF ALUMINUM ALLOYS cut the weight of this cage by 3,700 lb. Cage capacity was increased from 24 to 36 men as a result.

Aluminum in the Mining Industry

E. P. WHITE
Development Division
Aluminum Company of America

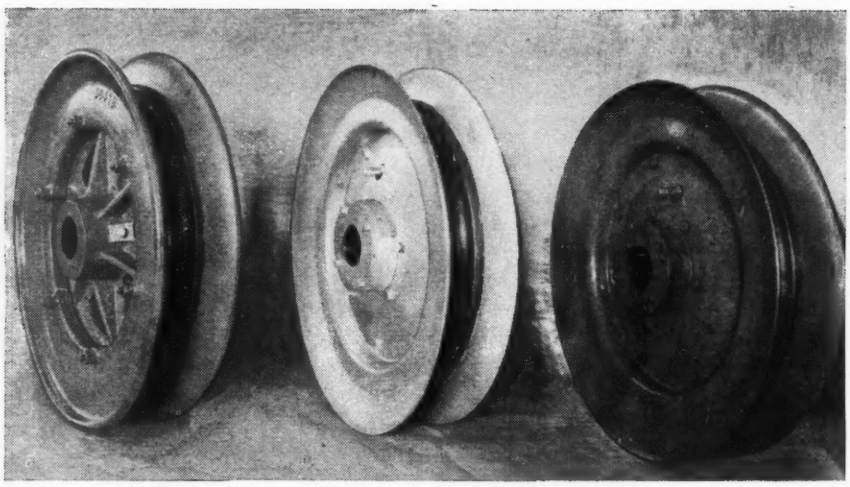
THE MINE OPERATOR TODAY must continually explore new methods and materials in order to operate at a profit, and cope with the problems of going deeper underground, hauling larger quantities of lower grade ore, and making the individual miner's job as easy as possible. Fifteen years of operating experience and test data in the mining industry prove that in many uses aluminum alloys are of considerable help in minimizing these problems.

It is important, however, to emphasize the word "alloy." Commercially pure aluminum, fully annealed, has a yield strength of about 5,000 lb. per sq. in., but by means of alloying and heat treatment, the yield strength of wrought alloys is increased to 60,000 lb. per sq. in. or more. In addition to strengthening mechanical properties, the variation of alloying elements also changes the resistance to corrosion of aluminum for many exposures. Consequently, maximum performance in any job is achieved only after the correct alloy has been selected.

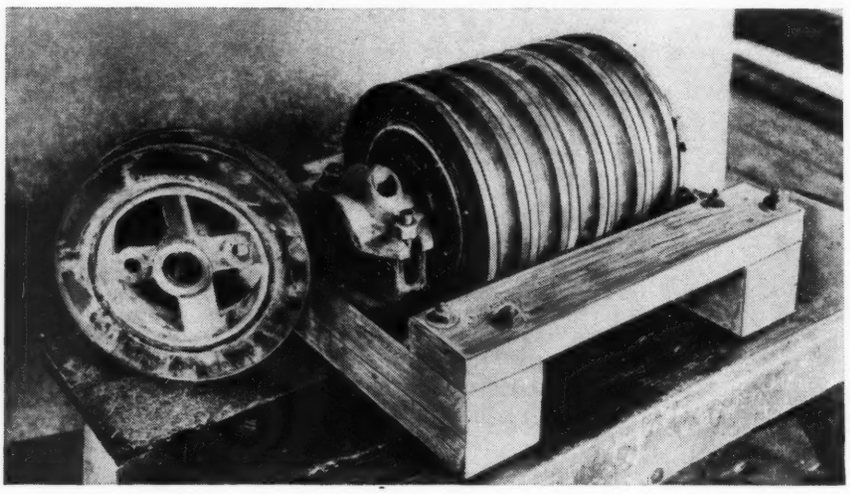
There are several different alloys of aluminum, roughly divided into two groups: the non-heat-treated and the heat-treated alloys. The latter group contains the "high strength alloys," and this is the group with which mining engineers and mine operators are primarily concerned.

One alloy in particular, Alcoa Alloy 61S-T6, has wide possibilities in the mining field. The typical yield strength of 61S-T6 is 40,000 lb. per sq. in. Its weight is approximately one-third that of steel, its resistance to corrosion is very good and it is one of the most easily formed of all the heat-treated alloys. For extremely rough usage, Alcoa Alclad 14S-T6 plate often does an excellent job. It has a typical yield strength of 60,000 lb. per sq. in. and a typical ultimate strength of 68,000 lbs. per sq. in. Alclad 14S-T6 plate is not, however, as readily formed as 61S-T6, requiring bend radii of 1½ to 2½ in. for 90-deg. bends of ¼-in. plate. Table I summarizes the recommended alloys for aluminum mine equipment as well as recommended alternate materials and some application for which aluminum should not be used.

Fabrication and maintenance in handling aluminum should cause no difficulty in most shops familiar with steel practice. Standard riveting practice is used, aluminum rivets being preferred in all cases. Steel rivets, however, have been and are being used with satisfactory results. Standard steel tools are ade-



ALUMINUM, RUBBER-LINED IDLER SHEAVE in center weighs 88 lb. Steel sheave on right weighs 115 lb.; cast-iron sheave on left weighs 288 lb. A light sheave saves wear on hoisting ropes.



RUBBER-FACED ALUMINUM ALLOY IDLER ROLLER for hoisting cable lasts 50 times longer than old wooden ones. The bushing is of bronze. Five wheels make up one roller.

TABLE I—Aluminum Alloys for Mine Equipment and other Materials to Be Used in Conjunction with Aluminum

WROUGHT ALLOYS:

For shapes, bars and plate in skips, cages, cars, roof beams, drill posts, pry bars and other uses requiring strength	61S-T6
For plate subjected to extremely rough usage as in skip bodies	Alclad 14S-T6
For non-stress carrying sheets as in man-cage doors, etc.	3S-H14
*For drainage pipe	63S-T5
For rivets	53S-T61
*For bolts	24S-T4 and/or Alumilite 205

CAST ALLOYS:

For castings requiring high strength, durability and very good corrosion resistance	220-T4
For castings requiring good strength, weldability and very good corrosion resistance	356-T6
For castings requiring only moderate strength, weldability and very good corrosion resistance	43

ALTERNATE MATERIALS:

RIVETS—Steel rivets may be used, but only when it is not possible to use aluminum rivets.

BOLTS—Stainless steel or heavy galvanized steel may be used.

ABRASION RESISTANT MATERIALS:

All bearing surfaces, wheels, shafts, wear plates and liner plates should be made in steel. Furthermore, steel wear plates should be used wherever abrassion, and not corrosion, is the principal cause of serious deterioration

*A compound such as Alcoa Thread Lubricant or Navy Aeronautical Specification AN-C-53 should be used on all pipe and bolt threads.

quate for machining, drilling, tapping, etc. Generally speaking, aluminum is easier to machine than steel, but by reason of its greater machinability, aluminum can be cut more efficiently when tools are specially ground. Such tools should have keen edges with more side and top rake than is usual for steel. Aluminum alloy sheet, plate, and shapes ½ in. or less in thickness can be sheared on any of the types of equipment used for steel. Blades should be sharp and clearances adjusted to give smooth cuts. Material thicker than ½ in. should be sawed. Standard circular, band or hack saws will do a satisfactory job. Because of inherent characteristics of aluminum, however, flame cutting should not be practiced.

Welding Not Difficult

Welding of aluminum is not difficult, as many shops are proving today, although flux should be removed from all welds in which it is used. During the past two years, the argon-shielded tungsten arc method of welding has come into general use, eliminating the use of flux. Inasmuch as the welding of aluminum results in a partial annealing of the welded area, such joints are not recommended in highly stressed areas. There are, however, many places where the reduction in strength does not matter and where welding is the best and most economical method of joining.

Early Installations

One of the first uses of aluminum in the mining industry was in the summer of 1931 when the Link Belt Co. designed and built a large belt-conveyor installation for the Thunder Bay Quarries Co. of Alpina, Mich. In six 60-ft. aluminum booms, the savings effected by weight reduction alone eliminated the differences in the cost of the installation. Other items of aluminum mining equipment installed by other mines during 1931 included pit car loaders, vibrating screens, skips, cages and a tramway bucket and carrier.

More extensive use of aluminum began in 1932 and 1933. Three 5-ton skips were put into service in 1933 by the Calumet and Hecla Consolidated Copper Co. at Calumet, Mich. Saving approximately 2,200 lb. or 25% of weight, these skips permitted increased capacity and greater depth of operation. As of July, 1947, one of these skips was

still in operation in the Senaca mine of Calumet and Hecla. Encouraged by the excellent service of these skips, Calumet and Hecla designed an 8¼-ton skip. To date, seven of these skips have been built, three being put in service in 1939, one in 1940, and three in 1943. All seven of these skips are still either in service or in standby.

At the same time that the 5-ton skips were put in service, Calumet and Hecla experimented with some aluminum rollers with rubber wearing faces to be used as shaft rollers in carrying skip cables along the bottom of the inclined shafts. An aluminum roller section weighed only 90 lb., saving 20 lb. per section, and was estimated as giving about 50 to 100 times the life of the replaced wooden roller sections. These composition aluminum-rubber rollers performed so well that all shafts in present operation are being equipped with them throughout.

Cage Weight Cut 6,500 Lb.

In 1934, the Cleveland Cliffs Iron Co., Ishpeming, Mich., installed three skip-cage combinations. As only 4,450 lb. of aluminum was needed, 6,500 lb. of weight was saved in each cage, permitting increased speed of operation and decreased power cost. These units operated so well that additional equipment was built and installed. All of the aluminum equipment built by Cleveland Cliffs is still either in service or in standby, and is summarized in Table II.

In addition to the listed equipment, the company plans to add more units of the same type for further operations in the Marquette Range.

Profiting by the experience of Calumet and Hecla and Cleveland Cliffs, many other mine operators in the Upper Michigan Territory have invested in aluminum shaft haulage equipment. Among those using aluminum are the Castile Mining Co. and the Montreal Mining Co. Each of these Ogelbay Norton Co. subsidiaries has four skips, two being operated in balance while the other two are held in standby. Hauling an average load of 10 to 10½ tons of iron ore on each trip, these skips increase pay load and decrease maintenance of shaft guides and other related equipment.

At the same time that Cleveland Cliffs installed their first aluminized equipment in Upper Michigan, the Cayuga Rock Salt Co. at Meyers, N. Y., installed an aluminum man-

TABLE II—Equipment Built by Cleveland Cliffs Iron Co.

Quantity	Equipment	Put In Service	Place
3	Double-deck cage combination with skip (Cage capacity—30 Men) (Skip capacity—6 Tons)	1934	Cliffs Shaft Mine
3	Larry cars—100 cu. ft.	1938	Maas Mine
1	Double-deck man cage (Capacity—50 Men)	1937-1939	Maas Mine
1	Double-deck man cage (Capacity—50 Men)	1937-1939	Athens Mine
1	Double-deck man cage (Capacity—50 Men)	1937-1939	Negaunee Mine
2	Double-deck man cages (Capacity—75 Men)	1945	Cliffs Shaft Mine

TABLE III—Aluminum Mine Haulage Equipment—A Partial List

Quantity	Equipment	Operator	Installed	Service Life
1	Mine car	Alcoa Mining Co.	1931	9 months until mine closed
3	45-cu. ft. skips	U. S. Smelting & Refining & Mining Co., Salt Lake City	1932	About 10 yrs.
3	Man cages	U. S. Smelting & Refining & Mining Co., Salt Lake City	1932	About 10 yrs.
3	5-ton skips	Calumet & Hecla Consolidated Copper Co. Calumet, Michigan	1933	10 yrs. minimum 1 still in service
2	Aerial tram buckets	Pittsburgh Coal Co. Renton, Pa.	1934	10 yrs.
1	Man cage	Cayuga Rock Salt Co. Meyers, N. Y.	1934	Still operating
3	Double-deck cages with skip	Cleveland Cliffs Iron Co. Ishpeming, Mich.	1934	Still operating
1	Mine car	Rock Island Improvement Co., Crescent Mine Peoria, Ill.	1934	Still operating
1	7-cu. yd. skip	Myles Salt Co. Weeks, La.	1935	Still operating
3	Double-deck man cages	Cleveland Cliffs Iron Co. Ishpeming, Mich.	1937-1939	Still operating
1	Double-deck man cage	Inland Steel Co. Morris Mine North Lake, Mich.	1937	Still operating
3	Larry cars	Cleveland Cliffs Iron Co. Ishpeming, Mich.	1938	Still operating
2	5¼-ton skips	Inland Steel Co. Morris Mine	1938-1940	1½ yrs.
2	Man cages	Inland Steel Co. Greenwood Mine Greenwood, Mich.	1938-1940	Still operating
1	Triple-deck man cage	Copper Range Mining Co. Painsdale, Mich.	1938	Length of service unknown. Mine is closed
3	8¼-ton skips	Calumet & Hecla Consolidated Copper Co.	1939	Still operating
1	8¼-ton skip	Calumet & Hecla Consolidated Copper Co.	1940	Still operating
4	10-ton skips (9 ton nominal cap.) (10-10½ ton aver. load)	Montreal Mining Co. Montreal, Wis.	1940-1941	Still operating
4	10-ton skips (9 ton nominal cap.) (10-10½ ton aver. load)	Castile Mining Co. Rumsey, Mich.	1940-1941	Still operating
2	Skips	Quincy Mining Co. Hancock, Mich.	1940	Operated until mine closed, 1945
3	8¼-ton skips	Calumet & Hecla Consolidated Copper Co.	1943	Still operating
2	Double-deck man cages	Cleveland Cliffs Iron Co. Ishpeming, Mich.	1945	Still operating
1	Self-dumping cage	O'Donnell Mine Fairmont, West Va.	1947	Still operating

TABLE IV—Mine Roof Beam Comparison Table

Material	Shape	Weight	*Strength Factor	*Deflection Factor
Alcoa 61S-T6	4" H	4.85 lbs/ft.	18.9	9.3
Alcoa 61S-T6	5" H	6.63 lbs/ft.	33.4	4.2
Alcoa 61S-T6	6" x 4" WF	4.24 lbs/ft.	25.4	4.6
Alcoa 61S-T6	6" x 6" WF	5.55 lbs/ft.	34.4	3.3
Alcoa 61S-T6	6" H	8.04 lbs/ft.	51.4	2.3
Alcoa 61S-T6	8" x 5¼" WF	6.03 lbs/ft.	49.6	1.8
Alcoa 61S-T6	8" x 6½" WF	8.49 lbs/ft.	73.8	1.2
Alcoa 61S-T6	8" x 8" WF	10.94 lbs/ft.	96.0	0.91
Alcoa 61S-T6	8" H	11.51 lbs/ft.	96.5	0.89
Alcoa 61S-T6	12" I	11.31 lbs/ft.	127.0	0.46
Alcoa 61S-T6	12" I	16.01 lbs/ft.	168.0	0.35
Oak	4" x 6"	7.1 lbs/ft.	8 8	14.3
Oak	6" x 6"	10.5 lbs/ft.	12.8	10.1
Oak	6" x 8"	14.3 lbs/ft.	23.8	4.0
Oak	8" x 8"	19.5 lbs/ft.	32.4	2.9
Oak	10" x 10"	31.3 lbs/ft.	65.7	1.1
Oak	12" x 12"	45.9 lbs/ft.	115.8	0.5
Steel	4" H	13 lbs/ft.	17.2	3.3
Steel	5" H	18.9 lbs/ft.	31.4	1.4
Steel	6" x 6" WF	15.5 lbs/ft.	33.4	1.1
Steel	8" x 8" WF	31.0 lbs/ft.	90.1	0.3
Rail Steel		30 lbs/yd. Rail	8.3	7.8
Rail Steel		50 lbs/yd. Rail	16.4	3.6
Rail Steel		70 lbs/yd. Rail	27.0	1.8
Rail Steel		90 lbs/yd. Rail	40.3	1.0
Rail Steel		112 lbs/yd. Rail	59.7	0.5

*Strength and deflection factors used here are arbitrary mathematical figures indicating the relative loads which can be carried and the corresponding amounts of deflection, e.g. A 4" H-beam in Alcoa 61S-T6 will carry the same load as the 4" steel H-beam, but will have 3 times as much deflection because of the lower modulus of elasticity of aluminum.

TABLE V—Mining Equipment Using Aluminum

1. Beams (for underground roof support and structures)
2. Blowers and fans, and ventilation pipes.
3. Buckets
4. Cable (especially bore hole and feeder cable)
5. Cages
6. Cars
7. Chutes and chute liners
8. Compressors
9. Drill housings, posts, post fittings and feed bars
10. Idler wheels and idler rolls for sheaves, etc.
11. Ladders
12. Lamps
13. Pipe (especially drainage pipe)
14. Portable equipment in general
15. Powder (for treatment of silicosis)
16. Rail benders
17. Removable or portable attachments on heavy equipment
18. Roof jacks
19. Safety hats
20. Scaling bars
21. Screens
22. Shaker conveyors
23. Shovels
24. Skips

cage. This 1,650-lb. cage replaced a nine-year-old steel cage, weighing 2,800 lb., a weight saving of 41%. During the nine-year life of the steel cage, maintenance was both frequent and costly. In 1947, after 13 years of continuous service, carrying men, materials, and occasional loads of "chunk" or "cattle" salt, the aluminum cage was still in very serviceable condition. Only once, in 1942, has this cage been removed from the wet shaft of the mine for maintenance. This fine record has been made despite operation under conditions where the cage is often partially submerged in the brine sump of the shaft while the skip above is loaded.

In 1935, one year after the Cayuga Rock Salt Co. cage installation, the Myles Salt Co. of Weeks, La., started using a 7-cu. yd. aluminum skip. This skip is still in operation and has done its job so well that other salt companies are investigating similar applications.

Although coal mining service usually is not as abrasive to haulage equipment as is ore handling, high corrosion rates and rough usage give figures that are somewhat comparable. In 1934, the Union Collieries at Renton, Pa., now a part of Pittsburgh Consolidation Coal Co., put in two aluminum aerial tram buckets to haul mine refuse and bony. Handling approximately 3 tons of refuse each trip, these two buckets were an economical choice by reason of power saving and a greater safety factor for both cables and supporting towers. After approximately ten years, these buckets were worn out. Replacement was made with steel since aluminum was not available for that purpose during the war. After replacement, it was found that the aluminum buckets had dumped "cleaner" than the steel buckets in addition to giving greater overall corrosion resistance.

Aluminum Mine Cars

Similar excellent service is being rendered by an aluminum mine car built by Watt Car and Wheel Co. for the Crescent mine in Peoria, Ill. Fourteen years of continuous service in hauling coal from the mine have left this car in excellent condition—far better than steel cars of equal age.

Although space does not permit the discussion of all the aluminum mine haulage equipment built over the past eighteen years, Table III is a summary of the many units which have been in service during that period.

Roof beams are another use of aluminum in coal mines. Alloy 61S-T6 H-beams are now being used in many coal mines for the support of overlying material. In conditions where the beams are reused and re-handled, these beams are popular with both the mine operator and the miner. Light weight and corrosion resistant, they offer the additional feature of being non-sparking, a valuable asset in all cases where fire hazards exist. Table IV gives weight, strength and deflection comparisons for various types and materials of beams used.

Within the past six months the coal mining industry has shown much interest in aluminum drainage pipe. A few small scale tests

have indicated that aluminum mine drainage pipe should work well in many locations. The Logans Ferry Mine at Logans Ferry, Pa., used a section of aluminum pipe for nine years before the pipe perforated. In the same location steel pipe sometimes lasted only five or six days. Certainly corrosion resistance and portability mean much here.

Sixteen years ago, the Philadelphia and Reading Coal Co. put in about four miles of corrugated aluminum conveyor-belt housing at their mine processing plant in Mahanoy City, Pa. Fourteen years later Aluminum Company of America's research laboratory examined samples of this sheet and concluded that for practical purposes it was as good as it was when installed. The recently developed Alcoa industrial roofing and siding is attracting the attention of both mine and plant operators. Unexcelled in resistance to atmospheric corrosion by any other aluminum alloy known to Alcoa, this product is thought to be the right answer to many roofing and siding problems.

Another aluminum product that is receiving more and more attention is conductor cable. Insulated or bare aluminum cable has the advantages of low cost, light weight, and high resistance to corrosion. First installed for mine use in 1908, aluminum conductor cable is just now beginning to come into more extensive mining use. Light weight makes bore-hole suspension far easier than for heavy metal cables in addition to greater ease of handling underground. A development only two years old, insulated aluminum conductor cable even now promises to give many underground and open pit operators appreciable savings through its light weight and lower cost.

In addition to the preceding applications, which have good experience backgrounds, there are many experimental projects being carried out now. Light weight, comparatively low volume cost, and high corrosion resistance are the main factors which have stimulated experiments on coal dewatering screens, fine grading screens, and experimental mine chute liners.

Aluminum shaker conveyor pans have been under test for almost a year and have been found very satisfactory in handling coal. Recently a shaker conveyor of new design has been developed, using aluminum in both pans and frames. Very light, easy to handle and assemble, this new design of shaker conveyor can be moved about under many circumstances by one man and by two men in any location.

In addition to these applications, no discussion of aluminum would be complete unless it mentioned the various portable tools in common use throughout the mining industry. Table V summarizes most of the present uses for aluminum in the mining industry, and in it will be found many items of portable equipment which are using aluminum in their construction. These uses are so many and varied that space does not permit a detailed discussion. Suffice it to say that almost all equipment moved and handled by hand has been or can be lightened through the use of aluminum.

Non-Metallics in Agriculture

IN A PAPER presented at the AIME Northwest Industrial Minerals Conference recently, Roy E. Miller, president of Miller Products Co., Portland, Ore., discussed the rapidly expanding use of minerals in agriculture, particularly diluents, or non-metallic material used as an extender for diluting concentrated insecticides, fungicides or herbicides. He pointed out the increased use of diluents in the recent introduction of weed-killing chemicals, as well as in the manufacture of fertilizer ingredients and various fertilizer mixtures.

Lime, gypsum and talc have been added to soil as a source of desirable soil minerals. Sulphur is used as a fertilizer element, as a corrective for excess alkalinity of soil, and finely pulverized sulphur is used as a diluent and an insecticide. Diatomaceous earth and certain clays are used to coat particles of ammonium sulphate and ammonium nitrate during the drying process to prevent crystals from setting and keep the product free-flowing.

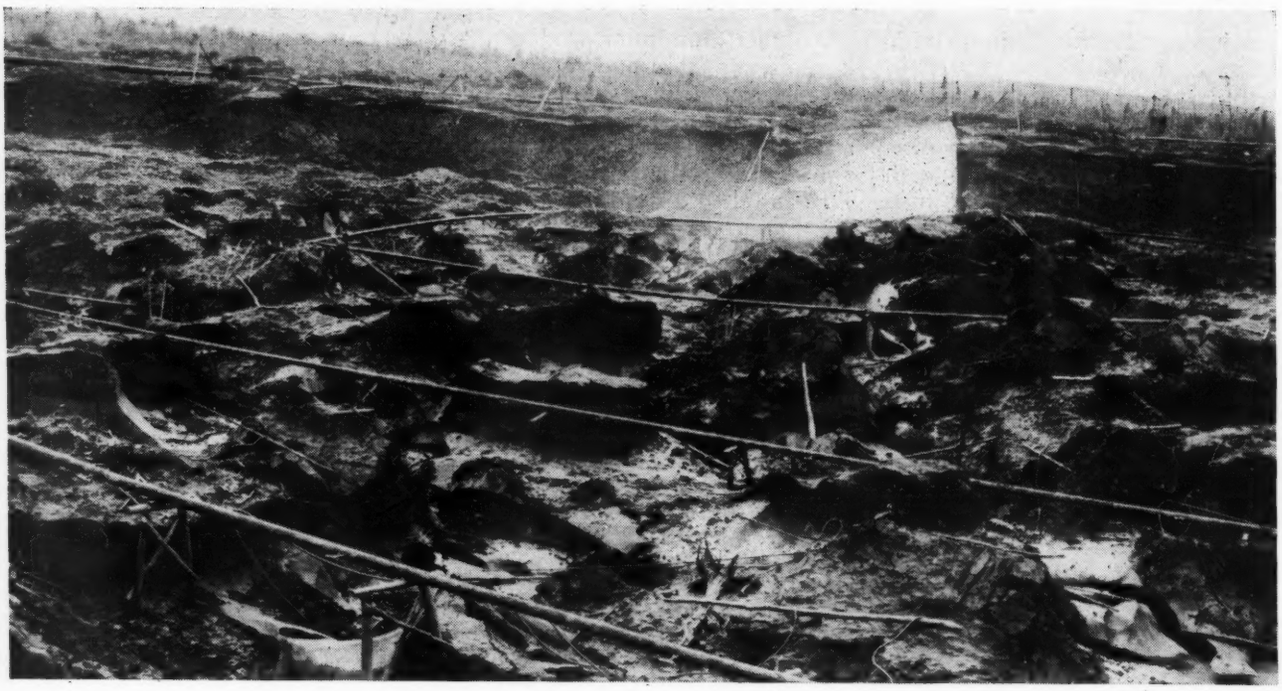
Though agricultural diluents are usually sold as inerts, having no insecticidal or fungicidal killing power in themselves, there are a number which, if used under certain conditions, have a definite effect on the insecticide and may add to or detract from, or even nullify, the end result sought. The study of agricultural diluents reveals a wide variation in mineral composition, impurities and in type of particles. Therefore, to determine the true value of a deposit in the agricultural field, the material must be tested and retested.

Individual Toxicities of Various Agricultural Diluents on Mexican Bean Beetle

	Mineral	Percent Mortality
Element	Sulphur all types tested	0%
Silicon	Tripolite	3.3 to 30.0%
	Diatomite	46.0 to 85.0%
Calcium	Ca Lime	30.0 to 60.0%
	Mg Lime	3.3 to 10.0%
Carbonate	Calcite	0.0 to 10.0%
Silicates	Talc	0.0 to 60.0%
	Pyrophyllite	0.0 to 20.0%
Clay	Montmorillonite (Bentonite)	0.0 to 65.5%
	Kaolinite	16.6 to 93.3%
	Attapulgite	60.0 to 75.5%
	Unidentified	3.3 to 66.6%

After a study of 61 agricultural diluents last year, specialists agreed that there was a wide variation in the toxicity of these materials largely due to the physical nature of the product rather than the chemical. It was also found that the effect of a diluent on the toxicity of a dust mixture following abrasion may arise from dessication and from increased penetration of the toxicant, and that relative importance of the two factors probably depends upon temperature and relative humidity. The adjacent table summarizes findings for various diluents in different groups.

The effectiveness of the diluent used as a carrier for insecticidal dusts is related to a number of factors: toxicity of the diluent itself; degree of electrostatic charge carried by particles; degree of fineness of particles; the pH degree of diluent; physical nature of particles; specific weight of particles; presence of certain chemical impurities; and the specificity of the diluent itself. Though agricultural diluents are in growing demand for the manufacture of fertilizer, soil amendments, and carriers for insecticides, continued research is needed to determine their limitations as well as their uses.



HUNDREDS OF SPRINKLER HEADS were used to spray water at 52 deg. F. to thaw some 400,000 cu. yards of frozen overburden which was removed from the dam site by hydraulic methods.

Building an Earth-Fill Dam

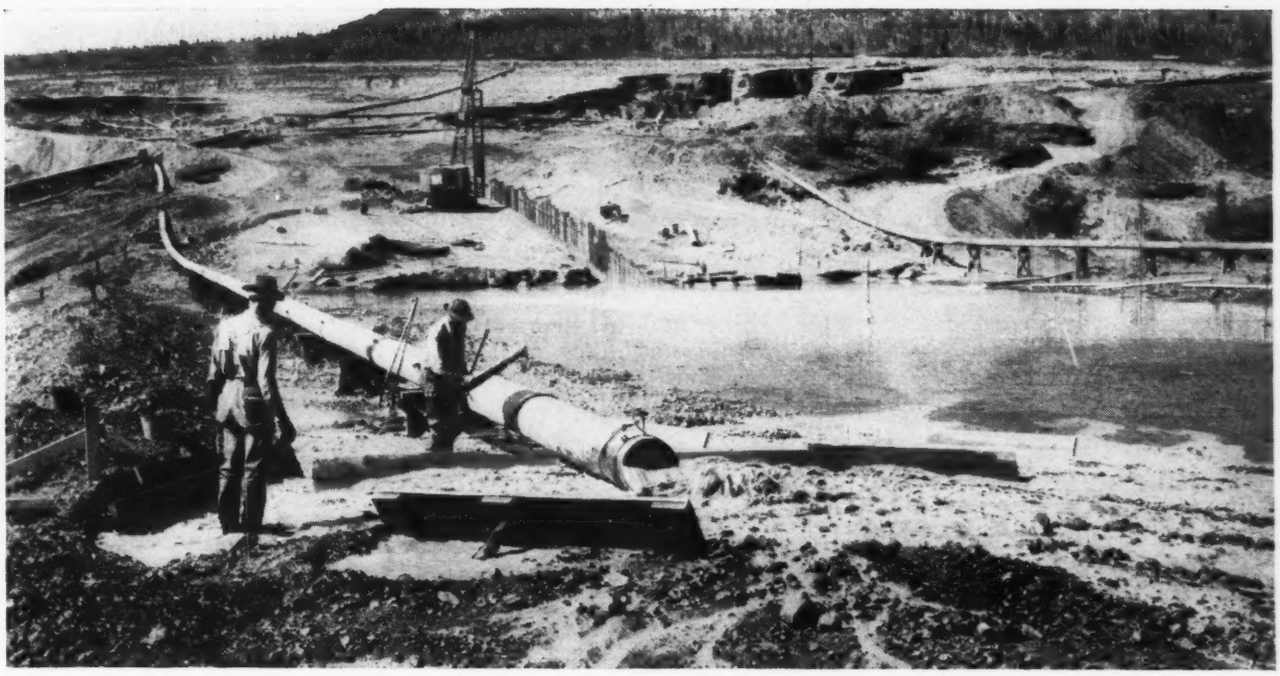
Permanently frozen ground in an inaccessible region where the annual open season is only 150 days long required unusual design and methods

JOHN B. HUTTL,
Associate Editor

WHEN LIVENGOOD PLACERS, INC., San Francisco, Calif., decided in 1939 to work its gold placer holdings in Alaska actively, one of the problems confronting them was to provide an adequate and dependable water supply. A study of this difficulty pointed to the construction of a storage dam. Investigations of possible sites led to the selection of Hess Creek which is 90 miles from Fairbanks and only 40 miles from the Arctic Circle. The dam was to be 83 ft. high with a cubical content of about 480,000 cu. yd.

Ordinarily, construction of such a dam presents no great difficulties, but in Alaska the story is different. In the isolated Hess Creek region

PIPE GRID CIRCULATES REFRIGERANT at temperature of —40 deg. F. to freeze toe of dam.

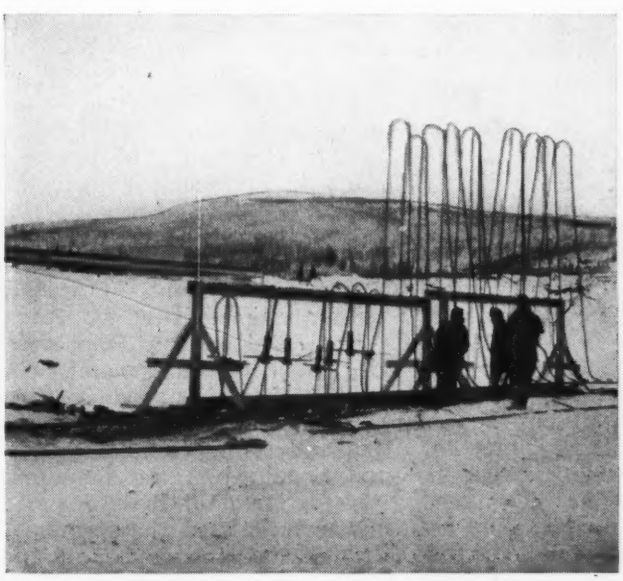


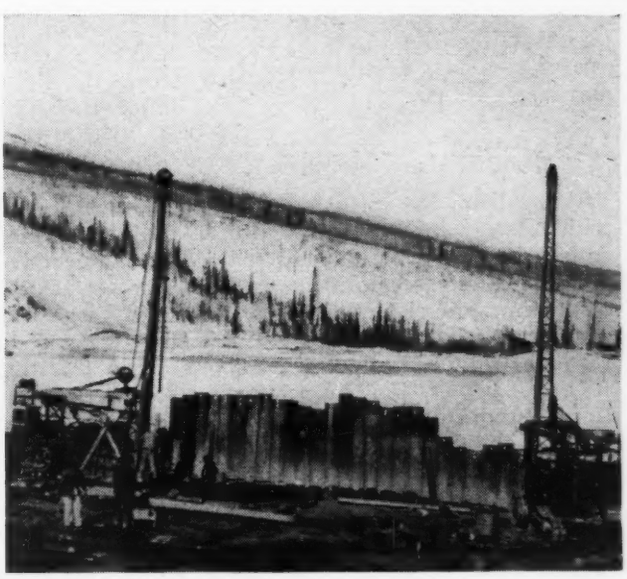
FINES REQUIRED FOR THE EARTH-FILL DAM were delivered hydraulically from a borrow pit and other sluicing operations. Fines constituted 16% of the volume of the puddled clay core of the dam.

in Arctic Placer Territory

the ground is permanently frozen, with the summer thaw penetrating no more than 2 ft. into the subsoil. Temperatures vary from 70 to 90 deg. F. in summer down to —90 deg. F. in winter. The "open season" lasts about 150 days. Because of these unusual conditions, conventional construction methods could not be used. In view of the high cost of transporting freight to the site, it was evident that the design should be one that would call for shipping in a minimum of equipment and material. Decision favored an earth-fill dam, either of rolled-fill or hydraulic-fill type.

Difficulties faced with the rolled-fill type were: (1) presence of considerable unbreakable rock fragments up to 15 in. in size in the available material, which would prevent compaction of fill placed in rolled layers, and (2) the shortness of the working season and the almost daily rains would make it impossible to complete the fill in the time allotted. The hydraulic-fill type also presented construction problems. Many of these were solved by working with the forces of nature instead of against them—a principle well known to the Alaska sour-





STEAM PIPES were installed to thaw trench on axis of dam. THEN, 20-FT. STEEL sheet-piling cut-offs were driven by piledriver.

dough. A major problem was that of obtaining sufficient fines to give the 16% of total volume required for the puddled clay core. By sinking test pits it was shown that these fines were available if two sluicing operations were carried on simultaneously, with a small borrow pit operating independently on the opposite end of the dam, supplying fines almost exclusively.

Stripping the Dam Site

To reach the solid formation upon which the dam would be laid, frozen overburden would have to be removed. This consisted of roots, trees and other old vegetable matter and, in some areas, ice 40 ft. thick. Average thickness of ice over the entire site was 20 ft. The solid formation was found to contain 31% water in frozen form. Early stripping was carried on with hydraulic giants, and at one time 27 units were operating. However, the method proved unsatisfactory because of insufficient runoff resulting in a water shortage during the operating season. The hydraulic giants made little headway in ice areas despite extravagant use of water.

Sprinkler heads using water at 52 deg. F. were tried. It was found that their continuous use had a substantial melting and flushing effect with consequent rapid sluicing away of the overburden. In fact, in the areas where the sprinkler was in operation the surface melted off at a rate of 4 to 6 in., in 24 hrs. Consequently, some 350 to 400 sprinkler heads were installed and 400,000 cu. yd. of overburden was removed. The resultant runoff eroded a series of channels, conveying a large load of solids to a collection pool. With these sprinklers it was possible to keep a flow of 17 sec.-ft. continually eroding the frozen surface.

Tundra Used as Filter

Water from the sprinklers laden with 25% solids flowing to the collection pool was pumped by a 16-in. single-stage pump driven by a 125-hp. diesel unit upstream against a head of about 40 ft., through two 24-in. pipelines, 2,000 ft. and 3,000 ft. long respectively, to old tundra beds. The grass moss mat of the tundra, 12 to 18 in. thick, served as an excellent natural filter, the solids remaining on top and the relatively clear water filtering into the creek bed to flow downstream to the storage reservoir at the dam. Distribution over the filter area was done by shifting the ends of the discharge lines and opening holes in them at strategic points.

Water from the storage reservoir was pumped against a 175-ft. head through the sprinklers by four 10-in. centrifugal pumps, each driven by a 110-hp. diesel unit. The sprinklers were shifted frequently. The pumps were subsequently used to deliver water to the hydraulic giants that sluiced down material from borrow pits for filling operations. The sprinkler water and filter water systems were in reality a closed-circuit arrangement in which there was a net gain of water, for the relatively warm water melted underlying ice with resultant increased return flow. Half of the material washed off the site was pumped to the tundra beds, and half went downstream.

Dam Stability a Problem

In considering the design of the dam proper, atmospheric and ground conditions during the open season were taken into consideration. With only a 2-ft. thaw it was necessary to design a structure that would make effective use of the continually frozen subsoil. It was desirable to prevent foundation instability during the warm summer months while it was exposed before filling started. In addition, if hydraulic fill placed on the thawed dam base was slow in solidifying, a porous core would result, giving a general instability to the entire structure.

These problems called for putting down a steel sheetpiling core on the axis of the dam, and installing a refrigeration plant to serve a grid-iron of 2-in. pipes in which to circulate a refrigerant that could freeze the 2 ft. of thawed ground solid.

Unique Refrigeration Plant

Only the toes of the dam were frozen. Use of freezing pipes under the main body of the dam was not necessary, as the bottom was frozen solid by the tendency of the cold to creep up into it from permanently frozen ground below. The toes were frozen during the winter previous to the start of construction, use being made of prevailing low temperatures for cooling a refrigerant in radiators set up in exposed locations. Two such radiators were built, one near each toe, consisting of 25 pipes of 1½-in. inside diameter and 300 ft. long. The banks were raised a few feet above the ground so that cold air would blow across them. Both ends of these pipes terminated in headers from which the refrigerant was pumped through the grid laid in the toes. Temperature of the refrigerant at times went to −40 deg. F., assuring thorough freezing of the main portions of the toes. Three men remained at the site of the dam from December to March to operate pumps which were required to circulate the refrigerant.

The line of steel sheetpiling on the axis of the dam could not be put down until steam pipes had thawed a trench. Piledriving did not follow the thawing too closely because it was desired to have the piling frozen in soon after driving. For the most part the piling was 20 ft. in length, and was put down 13 ft., leaving 7 ft. projecting up into the dam. (See illustrations on previous page.)

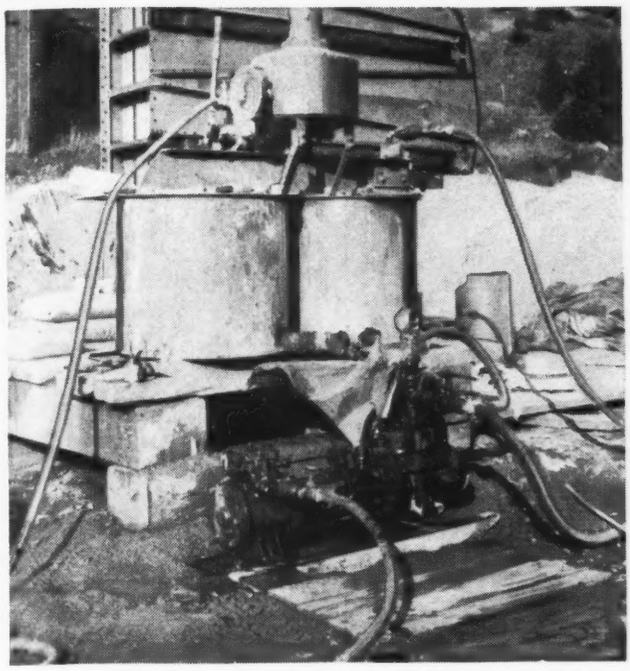
Fill Methods Not Unusual

Save for the frozen-ground feature described, hydraulic-fill methods were not unusual. The fill was carried up to within 27 ft. of the top before the war stopped construction. In 1946, by which time the central core of the dam had become well consolidated, the top was put on as rolled fill. The borrow pits used for hydraulic filling operations were at a higher level than the dam site and were worked with hydraulic giants. Sluicing by gravity to the hydraulic fill did not involve unusual problems.

Reservoir Covers 380 Acres

The Hess Creek dam as completed has a length of 1,675 ft., side slopes steepening from 2.5:1 at the base to 1.3:1 at the riprapped crest, a base width of 339 ft. and a crest width of 16 ft. The spillway on the right bank has its crest at 1,083-ft. elevation. The full reservoir will cover some 380 acres, and contain 7,700 acre-ft. of water. Twelve months after completion, records show that seepage was 0.3 acre-ft. per day, only 50% of the amount estimated.

E. A. Julian, San Francisco, is vice president and general manager of the Livengood company, W. A. Kraner was in charge of design and construction of the dam and remained at the site during construction. Dan Byer, as project manager, selected the location of the dam and supervised exploration and drilling operations. G. E. Purser was project engineer.



EQUIPMENT used to pump cement mixture to grout holes

AIR-OPERATED auger drill removed sand cores for piling

Grouting Stops Compressor Sway

SWAYING MOVEMENT which developed in two 2700-c.f.m. air compressors at the Mather "A" shaft of the Cleveland Cliffs Iron Co., Ishpeming, Mich., was stopped by grouting. Intrusion Prepakt, Inc., Chicago, Ill., performed the work described here.

Foundations for these compressors were put in more than three years ago on a sandy formation which had been tested for weight support and had shown a high factor of safety. The compressors were set level with the engine house floor. Previous experience with a similar installation at another mine on the Gogebic range set the precedent for this. There two machines of about the same size were operating with no sway on similar ground.

Compressors Develop Sway

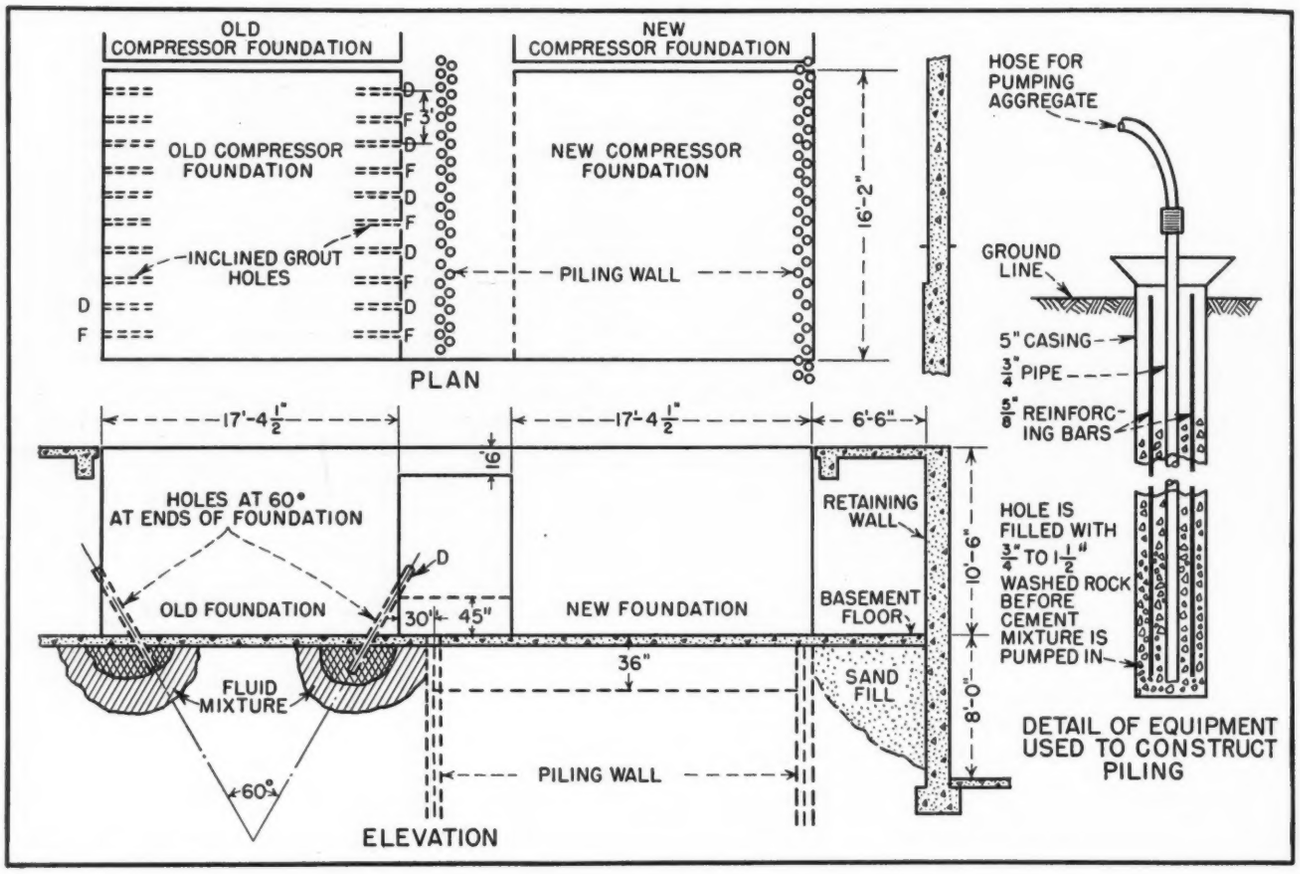
However the compressors at the Mather "A" mine started to sway slightly after installation, and this movement increased with time. Sway was temporarily reduced by driving oak wedges in a one-inch clearance space between the floor and foundations. This correction lasted for two years or until mine production had increased to a point where it was necessary to add two more compressors of the same capacity. Space had been left in the engine house for these new units.

The problem was to tie these new foundations to those existing so as to give support free from sway to the four machines and still keep the existing machines in continuous operation.

Complicating the problem was a concrete retaining wall between the engine house and boiler plant whose base elevation was 8 ft. below the basement floor of the engine house. Because of loose fill against the wall, any pressure from the compressor foundation against the wall would push it out of line. Consequently experienced contractors were hired to do the job.

Portable equipment used to perform the work consisted of a water tank mounted over two round mixing tanks equipped with agitators

REINFORCING BARS are lowered in casings for concrete piles.



ADDITIONAL SUPPORT was given to old compressor foundations by grouting and installing concrete piling

operated by air motors. (See illustration.) Portland cement, sand Alphacil and Prepakt Aid were mixed in the lower tanks to produce a slurry which was delivered by a reciprocating pump at a pressure of 400 p.s.i. through a one-inch rubber hose. Alphacil is a material similar to cement, and Prepakt Aid keeps the aggregate from contracting when it hardens.

Grouting Procedure

Procedure involves drilling 2-in. holes at each end of the foundation at an angle of 60 deg. to each other and grouting in ¾-in. pipes inserted at 3-ft. intervals along the side. The mixer hose was connected to this pipe, and material was pumped into the supporting sand until back pressure developed. Then the hose was attached to the opposite pipe and pumping repeated until pipes along both sides were filled. Next intermediate sets of holes were drilled and filled.

Mixture used was 2 sacks of cement, 1 sack of Alphacil and 3 lb. of Prepakt Aid. During pumping a surveyor's level, set up on the engine house floor, was kept sighted on the compressor to detect any rise resulting from liquid pressure under the foundation. When this occurred the holes were drilled deeper to allow the mixture to penetrate further into the loose supporting sand.

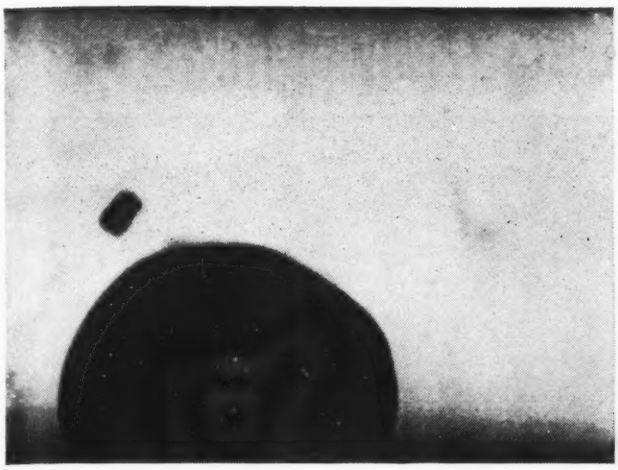
To prevent the mixture from traveling too far from the compressor foundation a series of piles, 10-ft. long, were put down. By wetting the supporting sand thoroughly, a 9-in. hole could be augered through to a depth of 10 ft. without caving the hole. The piles were put in on about 24-in. centers, and after setting 24 hr. an intermediate set was put down between the first ones. This was repeated until a wall was formed 30 in. from the foundation as shown.

The following procedure was used to construct the piles: First a sand core was removed with an air-operated auger. Then a galvanized iron pipe, the size of the hole, was dropped into the hole. A galvanized sheet iron cone was attached to the top of the pipe to keep the hole from caving. Next a ¾-in. pipe reaching to the bottom of the hole was placed near the center of the hole, and ⅝-in. reinforcing rods were placed on each side of the pipe. The hole was then filled with washed rock, ¾ in. to ½ in. in size after which the 9-in. casing was removed. The hose from the pump was connected to the pipe in the hole and the aggregate pumped in at the bottom. Thus the mixture rose to the top leaving no air holes. Such a pile can be built in less than ten minutes.

When the piling was completed, the mixture between the foundation and the wall was puddled until it formed a solid mass and hardened. Sway was reduced from .015 to .002 in. or practically stopped.

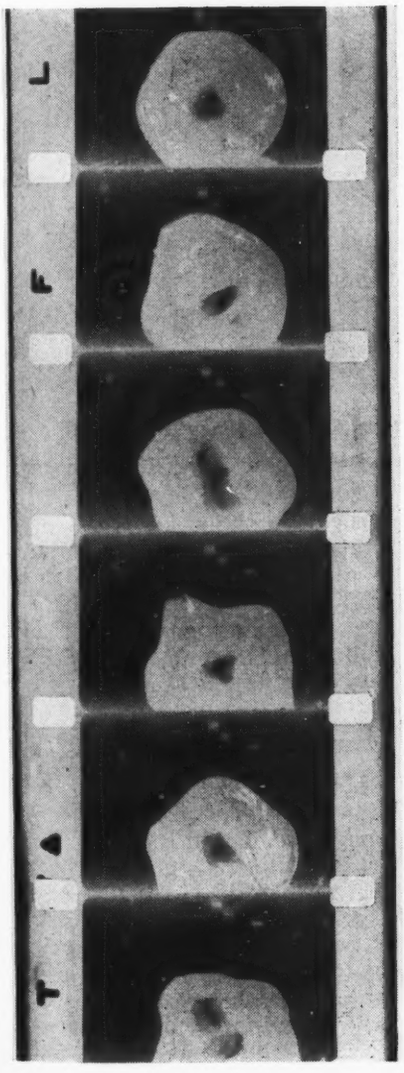
Piling Protects Wall

Before starting foundations for the new compressors a row of 9-in. piling 15 ft. long was installed to protect the retaining wall and fill sand. Sand in the forms was removed to a depth of 36 in. and four foundations were tied together with a 4-ft. slab of concrete poured between the new and old foundations and covering reinforcing rods and dowel pins set in drilled holes in the old foundations. The passage between the foundations is used for discharge lines and aftercoolers. If the first compressors had weaved themselves out of level they could have been releveled by pumping the liquid material underneath and allowing it to set.



High speed movies, taken through microscope, let you see

Bubble-Particle Contacts In Flotation



BUBBLES OSCILLATE when entering pulp, may thereby affect contact.

ONLY 1/3000 of a second separates the events shown in the photographs at the top of this page. A minus 48-mesh galena particle is shown just before (left), and just after (right), making contact with a rising 2-mm. air bubble.

These pictures are enlargements of two consecutive frames of a 16-mm. movie film exposed at the terrific speed of 3,000 frames per second. Normal movie speed is 32 frames per second.

The movie was taken by H. Rush Spedden and William S. Hannan, Jr., of the Richards Mineral Engineering Laboratories at Massachusetts Institute of Technology, in order to get a close-up, and slow-motion, look at mineral particles meeting air bubbles, as they might in a flotation pulp. The film invariably starts discussions and arguments wherever it is shown, and it should be seen by everyone interested in the mechanics of flotation.

How It Was Done

The filming technique is described in T.P. 2354, written by H. R. Spedden and W. S. Hannan, Jr., and published in *Mining Technology* for March, 1948 by the AIME. The film was first shown publicly at the annual meeting of the Institute in New York, March, 1948.

The object of Mr. Spedden's and Mr. Hannan's investigations was to set up a means whereby contacts between free particles and bubbles could be observed. It was found early in the work that study of captive bubbles did not tell enough about the actual behavior of freely-moving bubbles in a pulp.

To watch bubbles in action, it was necessary to set up a glass "flotation" cell on the stage of a microscope. Air bubbles were blown into this cell just below the field of view through a capillary tube. These bubbles were about 2 mm. in diameter. The microscope magnified the field 16 times.

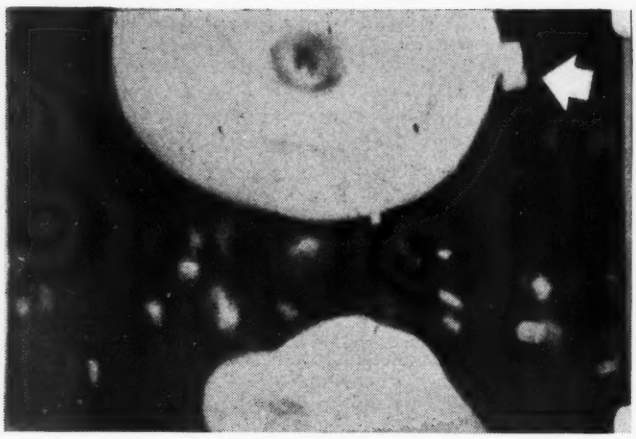
The mineral particles consisted of minus 48, plus 100-mesh galena; which had been ground in a porcelain mortar containing a 25-mg. per liter solution of potassium ethyl xanthate. The galena particles entered the cell as a pulp added below the liquid surface. Solution in the cell also contained 25 mg. per liter of xanthate.

This arrangement caused the rising stream of air bubbles to meet, and mix with, the falling stream of galena particles. Numerous contacts inevitably occurred, and the action was photographed by an Eastman high-speed camera, focused through the microscope, and running at 3,000 frames per second.

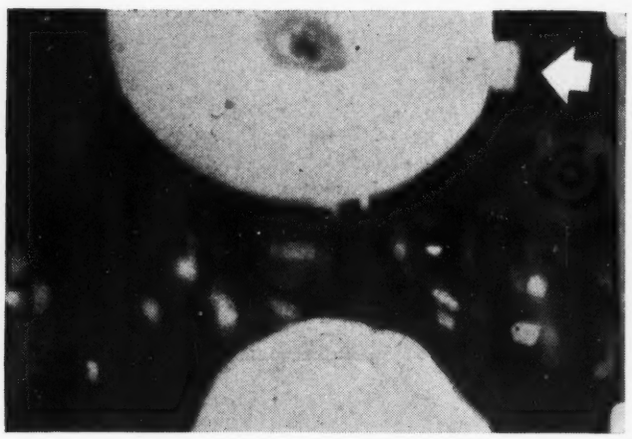
The movies thus taken can be studied frame by frame in an ordinary film viewer, and the exact sequence of split-second events can be observed. When the film is shown to an audience at ordinary projection speed, the events appear to take place 187.5 times slower than they actually occurred.

Even so, to a member of the audi-

This particle catches a bubble from behind:

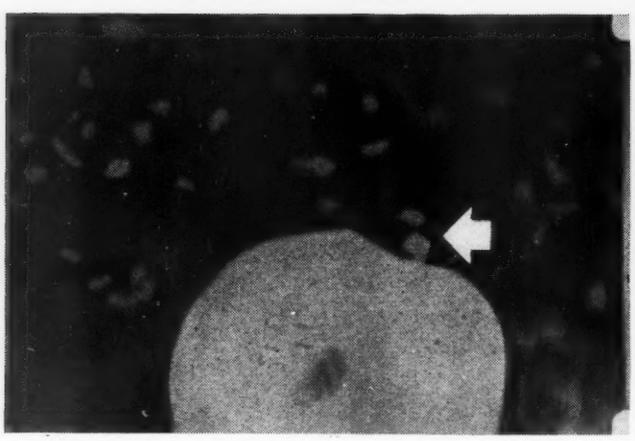


Brushing the bubble . . .

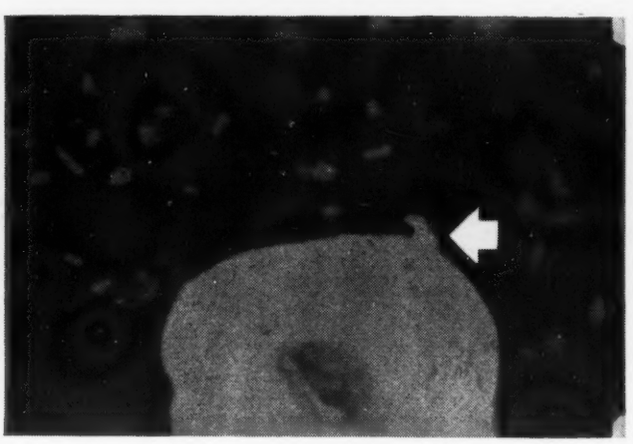


. . . on its lower hemisphere . . .

This particle hits a bubble but bounces off:



Sucked in toward the bubble . . .



. . . the particle is caught . . .

ence, the particle-bubble contact shown at the head of this article will appear to take place in 1/16 of a second, which is still too fast to permit details to be seen. The important thing shown by the projected film is the manner in which particles sweep up to bubbles, or vice-versa, and make contact with them or are rejected by them.

Behavior of Bubbles

One of the most interesting of the things one sees in the film is the violent oscillation of the bubbles just after they leave the capillary tube. The frequency of this oscillation is about 1,000 per second. We have attempted to show this oscillation by the strip of frames on page 95, but the nature of this movement has to be seen to be appreciated. It resembles nothing so much as a sequence in one of those cartoon comedies in which a violent battle is going on inside a sack or under a rug.

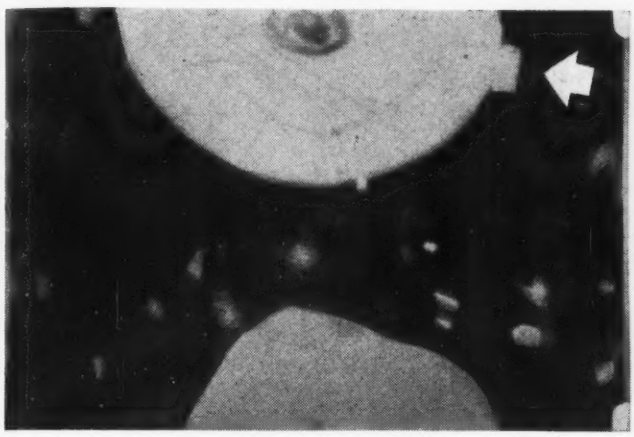
These oscillations certainly can be seen to affect contact. Some particles are knocked sharply away by a bulging bubble. Others are drawn in and held by a receding bubble face. The question is, do similar oscillations occur in full-size flotation machines, and if so, how much effect do they have?

Certainly bubbles blown through mats in a pneumatic machine should oscillate this same way, but Taggart has shown that the real concentration in an air cell takes place high in the bubble column presumably long after the bubbles have ceased to oscillate.

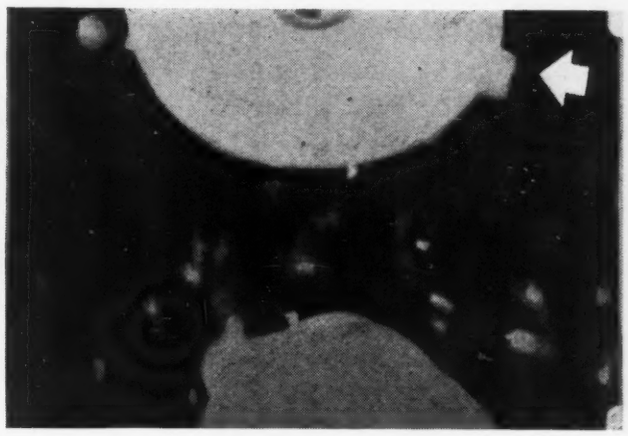
One may assume, in a mechanical machine, that the impeller, by beating air into the pulp, must also cause violent oscillation of the small air bubbles thus formed. Perhaps the violence of movement of these millions of closely-packed bubbles has some effect on agitation and bubble-mineral contact in the vicinity of an impeller.

Laminar or Turbulent Flow

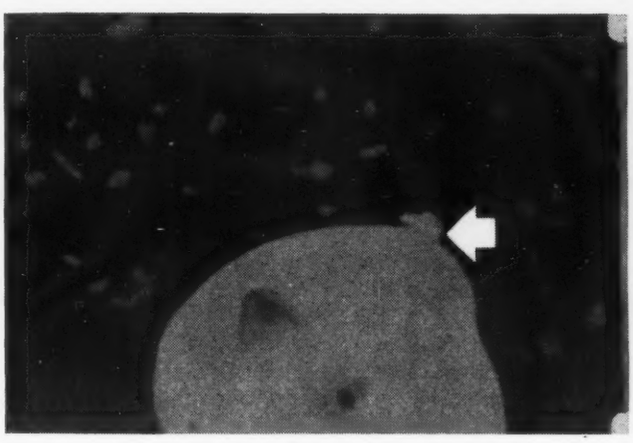
The paper accompanying this film states that particles move around the bubbles by laminar flow, but that a turbulent zone trails each bubble in which particles are often caught. This turbulent zone may result in a particle being thrown against, and held by, a bubble from behind. It is not easy to see this happening when one views this film, but close study, frame by frame, yields some instances of a particle catching a bubble from behind. One such con-



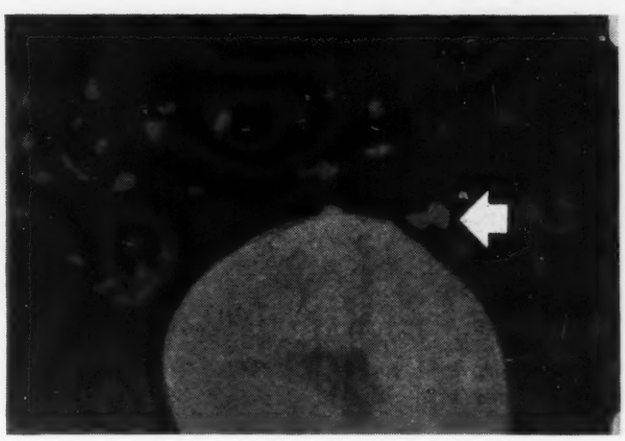
. . . the particle sticks . . .



. . . and is firmly held.



. . . but the oscillating bubble . . .



. . . snaps it off again.

tact is reproduced on these pages.

It can be seen that the laminar flow around many of the bubbles actually prevents very small particles from making contact, and this may help explain the difficulty of floating very fine sizes of minerals. Swept aside by bubble after bubble, very fine particles perhaps, can be caught only where the laminar flow is destroyed by agitation (oscillation?) or where it is interrupted, as in a froth column.

One other possibility exists. Taggart has shown by experiment that minute air bubbles can be produced in a pulp by violent agitation, even though no air is admitted from the pulp surface. Perhaps these very fine bubbles, precipitating out of the liquid phase of the pulp itself, actually grow on the surfaces of even the finest particles, and aid them in making contacts that eventually form a clump of floatable mineral.

Certainly the finest of particles can be floated, however difficult it may be. We know of one mill that has been producing for years a galena concentrate about 40% of which is finer than 2,100 mesh.

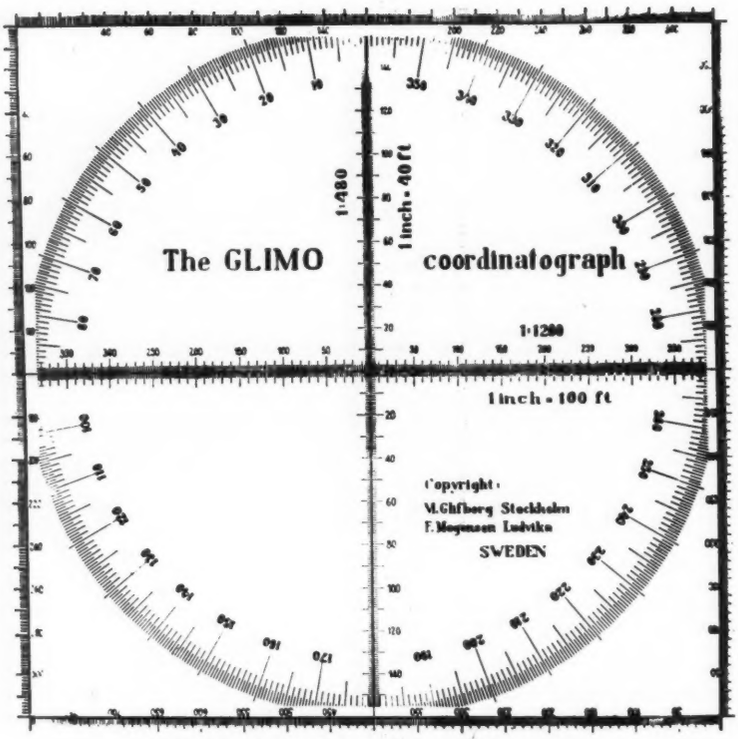
What Does It Prove?

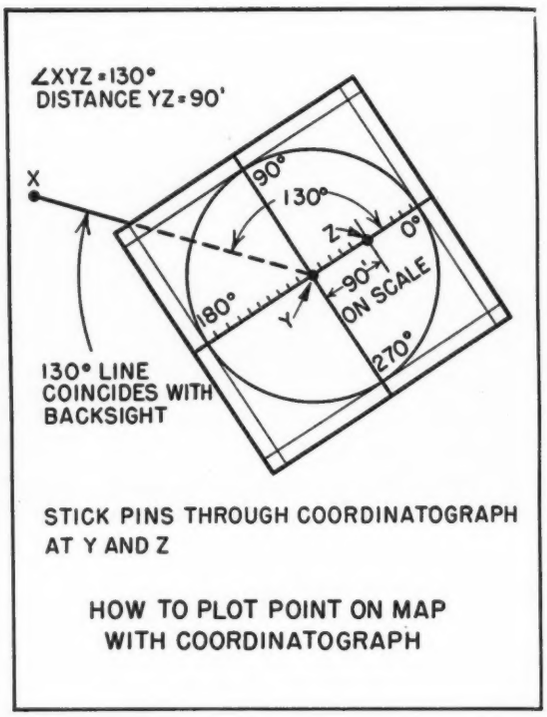
This movie shows clearly that air bubbles rising in a flotation pulp can pick up suitably-coated mineral particles. It shows also that laminar flow around such rising bubbles can interfere with attachment of very fine mineral particles. Also, an oscillation of bubbles released into a pulp was observed.

What the film does not demonstrate, of course, is that *all* bubble-particle attachments take place between rising, or "coursing", bubbles and descending particles. Nor does it show even that most of them do. It does show that some of them could, and it therefore lends support to the idea that the larger the air-swept volume of a flotation cell, the better job of flotation that cell can do.

It still remains for some investigator to find out exactly how a flotation froth can best be formed. Is it better to depend on bubble-particle contacts out in the pulp, or to concentrate on froth formation around the impeller?

In any event, Messrs. Spedden and Hannan are to be congratulated on a fine piece of work that has definitely advanced the knowledge of flotation. It is hoped they will be able to carry their work still farther, and perhaps eventually answer the question posed in the foregoing paragraph.





THE COORDINATOGRAPH is printed on a transparent sheet and serves as protractor and scale combined.

Coordinatograph Aids Mine Surveying

THIS COORDINATOGRAPH was designed by the inventor, M. Glifberg, of the Royal Swedish Bureau of Land Surveying, Stockholm, Sweden, and Frederik Mogensen, mining engineer and doctor of technology, Ludvika, Sweden, hence its name "Glimo" coordinatograph.

The coordinatograph consists of a circle, divided into degrees and half degrees, and linear scales along two diameters divided into feet. Linear scales are 1:480, or 1 in. = 40 ft.; and 1:1200, or 1 in. = 100 ft. The circle is inscribed in a square, which is bounded by four linear scales, two of which are 1 in. = 40 ft., and two which are 1 in. = 100 ft., as shown.

The coordinatograph is made from "Klarzell," a tough, transparent, non-shrinking material similar to tracing cloth. The center is reinforced by means of a small circular sheet of celluloid, which is to be pierced by a thin needle.

The manner in which the device is used to plot survey points on a map is best illustrated with an example (see illustration): Assume that a transit occupying station Y backsights on a known station X, and foresights on a new station Z. Assume angle XYZ is 130 deg., and that the taped distance YZ is 90 ft. Further assume that X, Y and line XY (the backsight) have been plotted on a survey map, scale 1 in. = 40 ft. To plot the new point, Z, on the map place the center of the coordinatograph over point Y, and stick it there with a pin. Then rotate the device until the observed angle (130 deg.) coincides with the line XY (the backsight). Point Z will then be along the O axis. Its distance from Y can be read on the scale on this axis, and plotted on the map by sticking a pin through the coordinatograph at the 90-ft. point. If the point is to be plotted on a map to scale of 1 in. = 100 ft., add 90° to the measured angle. Thus the distance YZ will be plotted along the scale 1 in. = 100 ft.

The device is relatively inexpensive, and may be discarded for a new one, after many points have been plotted by piercing the O-axis.

How to Plot Coordinates

It may also be used to plot points with known coordinates. Assume that a map is drawn to the scale 1 in. = 40 ft. and laid out on a coordinate system of 1-in. squares. To plot point X = 410.8, Y = 721.2 move the coordinatograph with the vertical scale on the left (1 in. = 40 ft.) coinciding with the line X = 400 until 21.2 on that scale coincides with the line Y = 700. Then stick a pin through point 10.8 on the top horizontal scale (near upper left corner) to plot point 410.8, 721.2. If a point with known coordinates is to be plotted on a map of scale 1 in. = 100 ft., turn the coordinatograph to use the two scales on the bottom and right sides of the square.

New Uses for Magnesium Increase 1948 Consumption

An official of the Magnesium Association has revealed an impressive record: new uses for magnesium developed in the first 6 months of 1948 alone have consumed 16,500,000 lb. of the metal during the year. Among major new applications, midget racing wheels required 300,000 lb. Magnesium lawn mowers have used 1,000,000 lb.; magnesium ladders, 1,000,000 lb.; pneumatic tools, 2,000,000 lb.; textile equipment, 10,000,000 lb., representing increases of 100%, 300%, 100+% and 67%, respectively, over consumption for these purposes for the same period last year.

MARKETS—Trends and Prices

Strong Price Situation in Copper, Lead and Zinc Continues—Aluminum Price Advanced to 16c.

WITH INDUSTRIAL PRODUCTION in this country at the end of the first half of the year hovering near the peacetime high, the outlook for major non-ferrous metals continued to favor the seller. Strong price conditions prevailed in copper, lead and zinc. Aluminum advanced 1c. per pound. Tin advanced 9c. per pound, effective June 1. Speculators learned that it is far easier to purchase platinum than to sell the metal. Selling pressure caused the price of platinum to fall from $98 an ounce troy to $75. Quicksilver, a metal in ample supply, continued to sell at prewar prices. Tungsten ore was unsettled, but chrome and manganese were quite firm so far as the metallurgical grades were concerned.

The E. & M. J. price index of non-ferrous metals advanced from 161.33 in May to 162.30 in June, a new high. Higher monthly averages for tin and aluminum were largely responsible for the rise.

The undertone of the market for copper as June ended appeared to be quite firm. The quotation in the domestic trade continued at 21½c., Valley, throughout the month. Apparent consumption of copper in the United States has been higher in the Jan.-June period than most observers thought possible. Based on statistics compiled for the fabricating division of the industry, consumption averaged around 118,000 tons a month. In spite of the approaching vacation period, demand for copper in the third quarter of the year is expected to continue at a high level. In fact, with some metal moving into the Government's stockpile, the supply situation is expected to remain tight over the remainder of the year, or until political tension abroad eases. Costs are rising and various producers are wondering whether the current rate of production can be maintained under such circumstances. The American Brass Co. raised its price schedule on copper and brass products late in June, attributing the mark-up to higher wage rates. Wage demands have been made by mine, mill and smelter workers, and the result of negotiations now in progress are being followed by all divisions of the industry because of possible upward pressure on the price structure.

Prices realized on sales of copper outside of the United States continued to cover a wide range. Some important producers continued to market their foreign production on the unchanged basis of 21½c., f.a.s. New York equivalent. Other operators, profiting by the selective selling policy of the large producers, took on business at prices ranging from three-quarters to a cent higher. This mixed situation was reflected in almost daily fluctuations in our weighted averages. The E. & M. J. average for copper sold in the foreign market for June was 21.696c. per pound, f.o.b. refinery, against 21.554c. for May. If sales of foreign copper to domestic consumers were included in our world price the average naturally would have been lower, as all of the foreign copper sold in the United States is being priced at the equivalent of the domestic quotation.

Imports of copper into the United States in the first four months of 1948, in tons, were as follows:

	Jan.-April
In ore, matte, etc.	30,964
In blister	58,123
Refined copper	78,754
Total	167,841

Stocks of refined copper in the hands of domestic and foreign producers reporting to Copper Institute totaled 225,207 tons at the end of May, against 217,493 tons (revised) a month previous and 220,014 tons at the beginning of the year.

In spite of the high price level for lead established early in April, production has not increased appreciably in any important mining center. However, hope exists that production will make some fair gains in the second half of the year. Strikes, now settled, hampered production in Mexico. Compared with the Jan.-June period last year, mine output in the first half of 1948 in Canada, Australia and the United States showed little improvement.

Lead Duty Suspended

An important development in lead, but with no immediate influence on the market, was the suspension of the import duty for one year, until June 30, 1949. The action is expected to facilitate purchasing concentrates and metal for importation into the United States. The import duty on refined pig lead was 1.0625c. per pound, and on lead in ore and concentrates 0.75c. per pound.

Demand for lead was active. Important consumers stood ready to take all of the metal that producers cared to sell. Domestic refineries produced 50,626 tons of lead during May, against 49,652 tons in April. Shipments by the domestic industry amounted to 47,652 tons in May, against 45,031 tons in the preceding month. During the first four months of 1948 the United States imported 89,073 tons of lead, of which 61,471 tons was pig lead, 7,339 was contained in base bullion, and 20,263 tons in ore, concentrate, etc.

Zinc consumers and producers passed through a trying period. Talk of a higher price, possibly to 14c. per pound for Prime Western, made consumers eager to accumulate metal. Sales, in most instances, were closed on the basis of price prevailing on date of shipment or at the average for month of shipment. Subsidy measures before Congress lost out, which induced producers of zinc concentrates in the Tri-State district to withhold part of their production for higher prices. Producers in that area were pulling for a 15c. price for zinc, equivalent to about $100 per ton for concentrate, basis 60 percent zinc.

Tin was fixed at $1.03 per pound for Grade A, effective June 1. This action was taken by the RFC shortly after it became known that the British advanced their buying and selling quotations. Congress voted to extend Gov-

United States Slab Zinc Statistics

(American Zinc Institute)

In Tons

	Production	Shipments				Stock at End	Unfilled Orders
		Domestic	Export	Gov't Acc't	Total		
1941	863,955	751,276	106,195	.....	857,471	24,066	87,666
1942	929,770	733,918	151,650	.....	885,568	68,268	52,752
1943	971,873	831,430	56,208	.....	887,638	173,510	44,914
1944	901,332	830,334	6,988	.....	837,322	237,520	21,332
1945	799,520	762,925	9,422	5,302	777,649	259,391	27,092
1946	759,346	714,292	66,638	62,007	842,937	175,800	58,057
1947	848,027	698,281	117,305	140,230	955,816	68,011	59,705
1948:							
January	71,505	64,605	9,670	10,156	84,431	55,085	67,562
February	66,784	62,503	5,893	5,212	73,608	48,261	72,224
March	73,209	64,241	8,298	3,702	76,241	45,229	61,610
April	70,330	63,535	6,469	2,645	72,649	42,910	71,691
May	72,742	66,161	5,468	89	71,718	43,934	71,018

ernment operation of the Texas City tin smelter for two years.

Aluminum advanced 1c. per pound on June 28. In announcing the rise, Alcoa said the third postwar round of wage increases has forced the company to lift its base price for pig aluminum to 15c., and for ingot to 16c. The rise is the first in more than 11 years. Production of primary aluminum in April totaled 53,277 tons, according to the Bureau of Mines, an increase of 3 percent over March and the highest monthly total since August 1944. Sufficient power was available in April to operate all facilities.

Supply and demand for silver were about in balance and the market for foreign-origin metal remained firm on the basis of 74⅝c. an ounce troy throughout June.

Refined platinum declined from $98 an ounce troy on wholesale lots to $88 on June 4, and to $75 on June 15. The lower level prevailed up to the close of business on June 30. However, on July 1, the price advanced to $88 an ounce on improved inquiry from the jewelry trade. The wide swings, observers claim, resulted from fairly extensive outside participation in an otherwise narrow market. The supply of platinum has diminished, making for a more sensitive situation in the precious metal. Palladium, on the other hand, was in ample supply and unsettled.

Quicksilver steadied largely on reduced selling pressure from European sources. Spot metal was maintained at $76 per flask throughout the month. Several lots sold at $75 per flask, ex dock, New York.

Major Metals

U. S. DAILY AND AVERAGE PRICES

1948 June	Electrolytic Copper Domestic (a) Refinery	Electrolytic Copper Export (b) Refinery	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	21.200	21.450	103.000	17.500	17.300	12.000
2	21.200	21.450	103.000	17.500	17.300	12.000
3	21.200	21.650	103.000	17.500	17.300	12.000
4	21.200	21.925	103.000	17.500	17.300	12.000
5	No Market	21.425	103.000	17.500	17.300	12.000
7	21.200	21.800	103.000	17.500	17.300	12.000
8	21.200	21.925	103.000	17.500	17.300	12.000
9	21.200	21.575	103.000	17.500	17.300	12.000
10	21.200	22.200	103.000	17.500	17.300	12.000
11	21.200	21.475	103.000	17.500	17.300	12.000
12	No Market	21.475	103.000	17.500	17.300	12.000
14	21.200	21.475	103.000	17.500	17.300	12.000
15	21.200	21.600	103.000	17.500	17.300	12.000
16	21.200	22.175	103.000	17.500	17.300	12.000
17	21.200	21.625	103.000	17.500	17.300	12.000
18	21.200	21.550	103.000	17.500	17.300	12.000
19	No Market	21.800	103.000	17.500	17.300	12.000
21	21.200	21.575	103.000	17.500	17.300	12.000
22	21.200	21.675	103.000	17.500	17.300	12.000
23	21.200	21.750	103.000	17.500	17.300	12.000
24	21.200	21.525	103.000	17.500	17.300	12.000
25	21.200	21.925	103.000	17.500	17.300	12.000
26	No Market	21.800	103.000	17.500	17.300	12.000
28	21.200	21.550	103.000	17.500	17.300	12.000
29	21.200	21.925	103.000	17.500	17.300	12.000
30	21.200	21.800	103.000	17.500	17.300	12.000
AVERAGES FOR MONTH						
June	21.200	21.696	103.000	17.500	17.300	12.000
AVERAGES FOR WEEK						
June						
2	21.200	21.475	97.600	17.500	17.300	12.000
9	21.200	21.717	103.000	17.500	17.300	12.000
16	21.200	21.733	103.000	17.500	17.300	12.000
23	21.200	21.663	103.000	17.500	17.300	12.000
30	21.200	21.754	103.000	17.500	17.300	12.000
CALENDAR WEEK AVERAGES						
June						
5	21.200	21.554	103.000	17.500	17.300	12.000
12	21.200	21.742	103.000	17.500	17.300	12.000
19	21.200	21.704	103.000	17.500	17.300	12.000
26	21.200	21.708	103.000	17.500	17.300	12.000

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1948 June	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
1	402.750	74.625	45d.	172s. 3d.	$35.00
2	402.750	74.625	45d.	172s. 3d.	35.00
3	402.750	74.625	45d.	172s. 3d.	35.00
4	402.750	74.625	45d.	172s. 3d.	35.00
5	(e)	(e)	(e)	(e)	35.00
7	402.750	74.625	45d.	172s. 3d.	35.00
8	402.750	74.625	45d.	172s. 3d.	35.00
9	402.750	74.625	45d.	172s. 3d.	35.00
10	402.750	74.625	45d.	172s. 3d.	35.00
11	402.750	74.625	45d.	172s. 3d.	35.00
12	(e)	(e)	(e)	(e)	35.00
14	402.750	74.625	45d.	172s. 3d.	35.00
15	402.750	74.625	45d.	172s. 3d.	35.00
16	402.750	74.625	45d.	172s. 3d.	35.00
17	402.750	74.625	45d.	172s. 3d.	35.00
18	402.750	74.625	45d.	172s. 3d.	35.00
19	(e)	(e)	(e)	(e)	35.00
21	402.750	74.625	45d.	172s. 3d.	35.00
22	402.750	74.625	45d.	172s. 3d.	35.00
23	402.750	74.625	45d.	172s. 3d.	35.00
24	402.750	74.625	45d.	172s. 3d.	35.00
25	402.750	74.625	45d.	172s. 3d.	35.00
26	(e)	(e)	(e)	(e)	35.00
28	402.750	74.625	45d.	172s. 3d.	35.00
29	402.750	74.625	45d.	172s. 3d.	35.00
30	402.750	74.625	45d.	172s. 3d.	35.00
AVERAGES FOR MONTH					
June	402.750	74.625	45d.	—	$35.00
AVERAGES FOR WEEK					
June					
2	402.750	74.625	—	—	
9	402.750	74.625	—	—	
16	402.750	74.625	—	—	
23	402.750	74.625	—	—	
30	402.750	74.625	—	—	

Calendar week averages, New York Silver: June 5th, 74.625; 12th, 74.625; 19th, 74.625; 26th, 74.625.

(e) Not quoted (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for the Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month; the premium on Special High Grade in most instances is 1¼c.

Quotations for lead are for common lead.

(c) Determined by Handy & Harman on the basis of market prices for bar silver, in cents per troy ounce .999 fine, in amounts of 50,000 oz. or more, nearby delivery, New York. Price quoted is in cents and one-eighth cent fractions and is usually about one-quarter cent below the market to allow for delivery, carrying, and marketing. In addition to foreign silver, the quotation also applies to domestic and Treasury silver if such silver enters into the market. The Treasury's purchase price of newly mined domestic silver 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

MARKETS—Trends and Prices

Miscellaneous Metals

(Monthly Averages)

Average prices of miscellaneous metals for May and June:

	May	June
Quicksilver, N. Y., flask	74.160	76.000
Antimony (a)	36.722	38.170
Antimony, bulk, Laredo	33.560	35.000
Antimony, in cases, Laredo	34.060	35.500
Antimony, Chinese (b)	....	....
Platinum, oz. troy	98.000	82.154
Cadmium (c)	175.000	175.000
Cadmium (d)	177.500	177.500
Cadmium (e)	180.000	180.000
Aluminum, ingot	15.000	15.115
Magnesium, ingot	20.500	20.500

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations. (e) Special shapes sold to platers.

E. & M. J. Weighted Index of Non-Ferrous Metal Prices

(100 is composite for 1922 - 3 - 4. Copper, Lead, Zinc, Tin, Silver, Nickel, Aluminum)

1938	73.67	1943	88.74
1939	77.71	1944	88.74
1940	79.22	1945	90.86
1941	83.49	1946	110.06
1942	86.80	1947	149.46

	1946	1947	1948
January	96.42	140.88	154.20
February	96.42	140.42	155.63
March	96.42	150.71	155.63
April	96.42	153.14	160.67
May	96.42	154.03	161.33
June	107.16	150.05	162.30
July	117.11	148.73	....
August	113.32	149.35	....
September	113.32	150.80	....
October	114.25	151.05	....
November	131.23	151.92	....
December	142.19	152.48	....

Official London Prices

Since Dec. 18, 1939, the British Ministry of Supply has named maximum delivered prices for the major non-ferrous metals. Prevailing delivered prices for consumers in the United Kingdom follow:

	Per Long Ton		
COPPER:	£	s.	d.
Electrolytic, high conductivity	132	0	0
Fire refined, high conductivity	132	0	0
Fire refined, high grade	131	10	0
Fire refined, min. 99.2 percent	131	0	0
Fire refined, min. 99.7	130	10	0
Hot rolled black wire rods	138	0	0
LEAD:			
Soft, foreign, duty paid	90	0	0
Soft, Empire	90	0	0
English refined	91	10	0
ZINC:			
Foreign (G.o.b.), duty paid	75	0	0
Domestic (G.o.b.)	75	0	0
Prime Western and debased	75	0	0
Refined and electrolytic	75	15	0
Minimum 99.99 percent	77	5	0
TIN:			
Ingot, 99 percent	569	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

(June 30, 1948)

Aluminum, ingot, 99 plus percent, lb. (base price)	16c.
Antimony, spot, lb., 5 tons and up but less than carload, in cases	38.17c.
Bismuth, ton lots, lb.	$2.00
Cadmium, commercial sticks, lb.	$1.75
Calcium, lb., ton lots, 98 percent, cast	$1.95
Chromium, 97 percent grade, lb., spot	$1.02
Cobalt, 97 to 99 percent, per lb.	$1.65
Indium, troy oz.	$2.25
Nickel, electrolytic cathodes, lb., f.o.b. Port Colborne	33¾c.
Magnesium, 99.8 percent, carloads, lb., producer's plant	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots), troy oz.	$75.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$76.00
Selenium, 99.5 percent, lb.	$2.00
Silicon, minimum 97 percent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75 nom.
Thallium, 100 lb. or more, lb.	$15.00
Titanium, 96 to 98 percent, lb.	$6.00@$7.00

METALLIC ORES

Beryllium Ore, 10 to 12% BeO, f.o.b. mine, per unit	$18.75@$22.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
48% Cr_2O_3, 2.8 to 1 ratio	$34.00@$35.00
48% Cr_2O_3, 3 to 1 ratio	$38.00@$42.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range Bessemer	$6.60
Mesabi bessemer	$6.35
Old Range non-bessemer	$6.45
Mesabi, non-bessemer	$6.20
Lead (Galena), 80 percent, Joplin, Mo., ton	$231.65
Manganese Ore—Per long ton unit of Mn. basis 48 percent manganese, subject to premiums and penalties, f.o.b. cars Atlantic and Gulf ports, duty paid, 67.6@72.6c.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Foreign, 60 percent, duty paid	$24.50@$25.00
Domestic, scheelite, 60 percent and upward	$28.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$78.00

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl., carload lots, delivered	6¼c.
Cobalt Oxide, 70 to 71 percent, lb., ceramic grade	$1.27@$1.30
Copper Sulphate, 100 lb.	$7.60

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of contained Be	$20.50
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	18.60c.
Ferromanganese, 78 to 82 percent, gross ton	$145.00
Ferromolybdenum, 55 to 65 percent Mo, lb. of Mo, contained	95c.
Ferrosilicon, 50 percent, per lb. of contained Si	9.3c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$2.25
Ferrovanadium, per lb. of V delivered	$2.90
Silicomanganese, 1½ percent C, per lb. contracts	7.8c.
Spiegeleisen, per long ton, 19@21%	$52.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$896@$960
Crude No. 2	$350@$545
Spinning fibers	$204@$378
Paper stock	$51@$78
Shorts	$24@$46
Vermont, f.o.b. Hyde Park:	
Shingle stock	$97.00@$107.00
Paper stock	$68.50@$85.00
Waste	$51.00
Refuse or shorts	$25.50@$46.50
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$11.50@$12.00
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$9.00@$9.25
Bauxite, long ton:	
Domestic, crude, 50 to 52 percent (not dried)	$4.00@$5.00
Domestic, chemical, 55 to 58 percent	(a)$8.50@$9.00
Domestic, abrasive, 80 to 84 percent	$16.50
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, airfloated, bulk	$6.75@$8.00
Maryland, ball, bulk	$7.00@$9.00
Feldspar, bulk ton:	
Potash feldspar, 200 mesh	$17.00
Glass spar, white, 20 mesh	$11.75@$12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois,	
70 percent, all rail movement, ton	$35.00
Acid 97.5 and 1 percent, bulk, ton	$42.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$27.00
Mica—Domestic f.o.b. mines. Punch 6 to 15 c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 60 to 65c.; 2 x 2 inch, 95c. to $1; 2 x 3 inch, $1.35; 3 x 3 inch, $1.80; 3 x 4 inch, $2.25; 3 x 5 inch $3.; 4 x 6 inch, $4; 6 x 8 inch, $6. Wet ground, very fine, $125@$155 per ton. Bulk sales, dry ground, $40@$80 per ton. Scrap, $30 and up.	
Ocher, Georgia, ton, in sacks	$24.00
Pyrites, Spanish, per long ton unit of S, cif. Atlantic ports	(a)12@14c.
Sulphur, Texas, mines, long ton	$16.00@$18.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50@$20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50

(a) Nominal.

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$39.00
Steel, base price, Pittsburgh billets, net ton	$45.00
Structural shapes, 100 lb.	$2.80

WASHINGTON REFLECTIONS

McGraw-Hill Washington News Bureau

Summary of Legislation Shows Good Results

President Truman's charge that the 80th Congress was the "worst" is not substantiated by the facts. During the two sessions the legislators passed many bills of prime importance.

Major legislation enacted by the 80th Congress in the first and second sessions included:

First session in 1947: Taft-Hartley labor act, Greek-Turkish aid, curtailment of war powers, Army-Navy unification, anti-portal pay, general foreign relief (short range), stopgap anti-inflation (voluntary program), and Presidential succession, also ratification of Inter-American treaty of reciprocal assistance, and peace treaties with Italy, Hungary, Bulgaria and Rumania.

Second session in 1948: A $4.8 billion tax reduction, European Recovery Program, military aid for China, draft revival—rearmament, Trade Agreements Act extension, displaced persons act, long-range farm program (compromise), and a resolution on foreign policy and the United Nations.

Legislation of prime importance to the mining and allied industries passed by Congress and signed by the President included: Assessment work suspension in the U. S. and Alaska, suspension of import tariffs on lead and metallic scrap, continuation of Governmental controls on tin and antimony, continuation of operation of Goverment-owned tin smelter at Texas City, Tex., authority to the Secretary of the Interior to issue patents on lands held under a colored title, an increase in the maximum allowable area which can be held under mine lease on the public domain, stream pollution control, and a stockpiling appropriation of $600 million.

Major legislation introduced in the 80th Congress which failed to pass included universal military training, inflation control measures, social security expansion, health insurance, minimum wage increase, aid to education, National Science Foundation, tidelands oil, general tax revision, Communist control, loyalty tests, anti-lynch and anti-poll tax, equal rights amendments, Hawaiian statehood, oleomargarine tax repeal (has a chance if Congress is called back after conventions), and a long-range housing program.

Bills of interest to the mining industry which failed to pass included the Russell and Malone subsidy measures, the Carson-Harless amendment to the Contract Settlement act of 1944, and the St. Lawrence Seaway project.

Should Congress be called back into session following the political conventions, the Carson-Harless measure would have a chance of passage, some observers believe.

Poor Management Causes Failure of Subsidies

Because of bad timing, and failure to follow through on the compromise worked out with Administration assistance (E&MJ, May, p. 105 and June, p. 101), proponents of metals subsidy legislation failed to obtain action in the second session of the 80th Congress.

It was mid-May before an amended Russell bill was put before the House Public Lands Committee. Before that time, at least a dozen versions of the legislation were submitted and rejected for one reason or another.

When the amended Russell bill finally was approved by the Lands Committee, the press of more important legislation caused a Rules Committee tabling of the measure. The bill never got beyond that point.

In the Senate, advocates of the subsidy idea had decided to wait for a House-passed bill, confident that the Senate would pass anything the House came up with. At the last minute Senator George Malone of Nevada introduced a bill which was a composite of most of the earlier ideas on the subject. It contained ideas expressed in the Russell bill, in the Bureau of Mines' suggested measure, and in the Snyder Plan, first evolved last year in Denver.

The Malone bill came up for floor action several times, was stopped twice by objections, and finally became the center of a long debate on the Senate floor during the last hours of the session. It was talked down. This was as close as any subsidy legislation came to a vote.

Should the Congress return after the political conventions, there might be a chance for further action on the legislation, but even though it were passed it would be vetoed, if in either form now before Congress. It is highly improbable that the Congress would override a veto of this legislation.

Munitions Board May Resort to Subsidies

Although Congress has appropriated $600 million for stockpiling—three times as much money as last year—stockpilers are under an unwritten mandate to "go easy" on the domestic market. The President, told controls are unnecessary if domestic markets are left alone, told stockpilers to "lay off." However, there are rumors that this policy may be changed.

The appropriation is split "50-50", half of it in cash, the rest in contract authority. The cash balance will be whittled by $75 million at the outset of the buying program. That's the amount needed to pay off last year's contractual agreements. Most of the remaining $225 million will be spent outside the U. S., either through standard procurement contracts, or through "arrangements" by Economic Cooperation Administration.

Use of the hefty contract authority could mean help, rather than hindrance, to American claimants for materials on the domestic markets. Although not yet perfected, stockpilers have a plan whereby some of the $300 million authority will be used to "subsidize" marginal metal and mineral producers in this country. This would give the stockpilers materials which otherwise would not be produced, thus reducing the drain on the domestic and world markets, and actually providing some increase in by-products for private users.

Use of the "subsidy" plan, from which the Munitions Board has violently shied away in the past, may provide the basis for a long-range stockpiling program utilizing marginal domestic industry as the source for many of the important metal and mineral commodities.

It is indicated that the "higher than market" prices will be tied to the Buy American differential provided by Treasury regulations several years ago —25%. There has been some discussion of a proposal to make the differential a 32% figure. The military's subsidy idea is particularly important to marginal producers now that the Congress failed to take action on mineral subsidy legislation.

ECA Will Promote Flow of Deficient Materials

The part the Marshall Plan arrangements will play in providing strategic and critical materials for the stockpile is still difficult to determine. The ECA has a legislative mandate to facilitate "transfer to the United States . . . of materials which are required by the United States as a result of deficiencies or potential deficiencies in its own resources," and to promote an increase in the production in participating countries of "materials which are required by the United States as

a result of deficiencies or potential deficiencies in the resources within the United States." Also, in appropriating ECA funds, Congress earmarked a portion "for strategic materials." How soon results from these provisions will be felt will depend on what resources are quickly available or facilities susceptible to quick improvement. Where ECA promotion of increased production requires actual mine development or major improvements in transportation, obviously the increased flow of materials will be deferred, in some cases for several years.

Bureau and Survey Get Record Appropriations

Despite threats that it would cut down the cost of Government operations substantially, Congress gave the U. S. Bureau of Mines and the Geological Survey 1949 appropriations that are the highest allowances in their histories.

The Bureau of Mines was given $21,694,900 for fiscal 1949, in addition to another $550,000 in contract authority for lignite research. The Geological Survey's 1949 budget totals $13,027,000.

Another feature granted the two bureaus was language allowing printing and binding costs for technical reports to come out of division allowances, in addition to a bureau allowance for printing and binding.

A breakdown of the Bureau's budget for the next 12 months shows the following items: Salaries and expenses, $164,600; investigating mine accidents and operating mine rescue cars, $1,165,000; coal mine fires, $250,000 (a new item in the budget); coal mine inspection and investigation, $2,431,500; testing fuel, $506,600; anthracite mining investigations, $396,100; lignite research laboratory, $200,000 (plus $550,000 contract authority); synthetic liquid fuels, $9,750,000; mineral mining investigations, $403,300; investigation and development of domestic mineral deposits, $1,560,000; coal investigations, $300,000; oil and gas investigations, $606,000; expenses of mining experimental stations, $1,385,000; metallurgical research and pilot plants, $1,460,000; care of buildings and grounds, Pittsburgh, Pa., $317,300; economics of mineral industries, $708,500; helium utilization and research, $91,000.

The Survey's budget for the next year includes: Salaries and expenses, $237,350; topographic surveys, $4,350,000; geologic surveys, $2,625,000; investigation of mineral resources of Alaska, $325,000; gaging streams, $3,496,700; classification of lands, $300,000; printing, binding, etc., $602,950; mineral leasing, $690,000; cooperative advance, $400,000.

Compared to the 1948 appropriation, the Bureau's budget for '49 shows an increase of $5,409,100 and the Survey's shows an increase of $2,450,660.

Supreme Court Sustains Non-Communist Oaths

The Taft-Hartley law stood up well in the first two major Supreme Court tests.

Of particular interest to the metal mining industry is the National Maritime Union case growing out of the National Labor Relations Board's refusal to grant this union a bargaining election among seamen of M. A. Hanna Co. and Wilson Transit Co. because of failure to comply with sections of the T-H law requiring registration with the Labor Dept. and the filing of non-Communist affidavits by union officers.

The NMU had appealed a lower court decision upholding the constitutionality of these T-H requirements. The Supreme Court, 7-2, upheld legality of the registration rule and, dismissing the appeal on that basis, considered it unnecessary to decide the validity of the non-Communist affidavit. This leaves in effect, then, the lower court's approval of it. Justices Black and Douglas favored taking up the constitutionality of both aspects.

The pressure is thus further increased on unions not yet in compliance and is reflected in the split within the Mine & Smelter Workers, CIO, over compliance. The castings division wants to comply, but can't swing a majority of the MMSW executive board.

Number of unions in compliance with the filing requirement shot upward during May. There were 159 national unions and 1,829 national officers, and 9,035 local unions and 83,272 local officers in compliance.

In dismissing, unanimously, the indictment against CIO president Philip Murray for printing an editorial in the CIO News, a weekly, urging the election of Rep. Edward A. Garmatz in Baltimore, the Supreme Court simply said that this was not a violation of the Taft-Hartley law.

This was in line with the views of framers of the T-H law—that labor press comment is not suppressed.

Labor's political plans suffered a jolt, however, in the court's refusal to declare the provision unconstitutional or to comment on whether unions could use union treasuries for other forms of political activities.

Professionals Can Have Own Bargaining Units

The National Labor Relations Board is gradually clarifying the status of professional employees under the Taft-Hartley law.

The law says the Board cannot mix professionals in the same bargaining unit with non-professionals without consent of the former. NLRB now says this same principle may be applied to situations where professional employees already are in a mixed unit and wish to get out. It permitted engineers employed by Illinois Bell Telephone Co. to vote on whether they wished to remain as part of the bargaining unit of 9,000 plant department employees represented by the AFL electricians union.

Other significant NLRB decisions involving professionals:

In the Worthington Pump Co. case, time-study men were classified as professionals, also the engineers and right-of-way agents of Illinois Bell and "estimators" employed by Austin Co. (Wage-Hour Administration definition of "professional" is not applicable.)

NLRB has classified the following as non-professionals: inspectors, diesel engine mechanics performing routine duties, newspaper reporters, laboratory assistants.

Now that Congress has put off any changes in the wage-hour law, Administrator William R. McComb plans to go through with changes of his own in his definitions of administrative, executive and professional employees who are exempt from the law. Hearings were held last winter.

New definitions are expected in late summer or fall. Inside information is that the definitions will be tightened so as to eliminate much of the doubt as to which employees fall within the above classifications. Also, the salary test of $30 weekly minimum for executives and $200 monthly minimum for administrative and professionals will likely be raised.

Can Allocate Steel for Military Requirements

The only direct allocation control allowed by the 80th Congress was slipped into the draft act during the debates on the last night of the second session.

An amendment which gives the Secretary of Defense the power to order the steel industry to give preferenc to customers with military contracts, was inserted into the draft act by Rep. Walter C. Ploeser of Missouri. Another Ploeser amendment orders Secretary Forrestal to give "a fair share" of defense contracts to small business. Both amendments were allowed to remain in the bill to save further argument.

The military priority means control over about one percent of total finished steel production. The Administration estimates that about 1,000,000 tons of steel will be involved in priority distribution.

Should a steel company balk at the priority, the military establishment has the right to seize the plant, and the responsible official is liable for a $50,000 fine and three years in jail.

If military steel orders exceed 10% of total production, the President must report the percentage figures to the Congress every six months.

President Truman said on July 1 that he favors voluntary allocation.

NEWS OF THE INDUSTRY

Lake Superior Mining Men Crowd the Sessions of Annual Safety Meeting in Duluth

Despite current iron-ore operations that are running in high gear to get out the maximum tonnage possible this season, over 600 mining men left their activities on the iron ranges to attend the 24th Annual Conference of the Lake Superior Mines Safety Council in Duluth, Minn., June 17 and 18. The sessions were held in the Hotel Duluth, with J. P. Victor, president of the Lake Superior Council, in the chair. Other officers of the organization for 1947-48 are: A. J. Stromquist, vice president; Frank E. Cash, secretary; and E. W. R. Butcher, treasurer. Mr. Stromquist was elected president for 1948-49 and F. J. Sullivan vice president. The other officers remain the same.

After a welcoming speech by George W. Johnson, Duluth's mayor, attention was directed to the program of papers on safety.

As Management Sees Safety

How far should the employer be responsible for employee's general economic security? R. C. Allen, vice president of Oglebay, Norton & Co., raised this question—which he said was still in its formative stages—in an address presented in his absence by D. S. Young. Mr. Allen said the question of the degree of the employer's responsibility for the employee's safety and health continued to be of great importance. But accident prevention in the narrow sense is only one phase of the problem. In his thinking he grouped occupational diseases with accidents. As the social conscience has worked itself out into law it has made the employer more and more responsible for the general welfare of the employees. Insofar as this movement has increased the cost of producing goods, the cost has been paid, or will be, by society in the price of goods. In the end, most people will come to understand this. Compensation and social security laws are educating their beneficiaries in the economics of production.

However, the cost of goods is not necessarily increased in the long run by wisely conceived and administered compensation laws. By assessing the cost of accidents to the employer and through him to the cost of goods, society has probably reduced the real cost of goods by stimulating the employer to eliminate the causes of accidents.

Dr. James Boyd, Director of the Bureau of Mines, who was on the program, was unavoidably absent. S. H. Ash, of the Bureau, presented his paper on "Improving our Safety Record." Dr. Boyd first dealt briefly with current plans of the iron ore industry to utilize low-grade deposits. Stating that virtually all major operating companies are now studying taconite beneficiation, he pointed out that the Bureau had maintained an experimental station for iron ore in Minneapolis for more than 25 years and cited some of its recent work on the reduction of iron-ore fines and slimes to sponge iron by gas reduction methods, using gas developed from North Dakota lignite.

Safety of mine and mine-plant workers has been one of the Bureau's main objectives since its start in 1910, the Director stated. The Bureau should be regarded as a partner with mining organizations in furthering this work. Lake Superior mines have led in accident prevention, he continued. Since 1928, with few exceptions they have earned top awards. Last year, 20 out of the 28 bestowed on metal mines and mining companies went to this region. In closing, Dr. Boyd asked for suggestions as to lines of action in which the Bureau can participate to lessen fatalities in mines, shops and plants.

O. J. Anderson, assistant mechanical superintendent for Butler Brothers on the Mesabi, discussed the causes of accidents that can happen in churn drilling and told of the measures taken to prevent them.

John H. Strome, safety director for Inland Steel Co., reviewed accidents in the Lake Superior District in 1947. The frequency rate remained at the high level of the past few years, though somewhat better than in 1946. The severity rate increased 32%, compared with the record low for 1946. The accident record for the district, however, is much better than for the metal mining industry in general.

The outstanding achievement in 1947 was in open-pit mining, where both the frequency rate and the severity rate improved. In summary, although the district's accident record was much better than that of the metal mining industry, statistics show room for improvement.

Some Ducktown Experience

Underground electric blasting practice in Tennessee Copper Co.'s mines was discussed by Lamar Weaver, superintendent of mines, who had prepared a detailed paper, supplemented by lantern slides. His talk received close attention. Despite inherent hazards with electric detonation in metal mines, it is generally conceded to be the preferred method of firing. Mr. Weaver recommended it, provided certain precautions are followed.

Safety in Sublevel Caving

Details that make for safety and economy in mining a deep orebody of soft hematite in weak wall rocks by sublevel caving on the Gogebic Range were discussed by R. P. Bremner, of Youngstown Sheet and Tube Co., raw materials department. For this purpose Mr. Bremner took a typical hanging orebody now being mined between the 28th and 29th levels at the Newport-Bonnie mines at Ironwood. The Newport mine won the Sentinels of Safety trophy in the 1944 National Safety Competition for underground metal mines.

Keeping Wiring Safe Underground

C. P. Burton, assistant superintendent of maintenance, Hibbing-Chisholm district, Oliver Iron Mining Co., outlined a proper maintenance schedule for components of a complete underground electrical system. Two purposes are served by the schedule; accidents causing electrical shock or failure of electrical equipment are minimized, and production loss due to electrical failure is cut down. Periodic checking of the system is essential, to prevent tampering and to see that it is functioning properly.

Points on Truck Haulage

If trucks are to fit in where increasing stripping ratios require maximum obtainable yards per man-hour, they must be handled more efficiently than they are today, according to H. E. Farnam, Jr., M. A. Hanna Co., Hibbing, Minn. The fewer the breakdowns, the closer the approach to uninterrupted production and the higher the general overall efficiency. A "push-button system" would be ideal. Accidents affect men as well as equipment. Thus the efficient way is the safe way.

Heavy-duty haulage trucks average about 5,000 operating hours per year. Thus there is reason for the sometimes apparent rapid wear of truck parts. Foremen should be able to recognize conditions unfavorable to the equipment. Seventy percent of breakdowns are due to abuse or negligence, Mr. Farnam declared. Abuse may result from improper upkeep of roads. Pits must be laid out properly. The driver must be trained and manual effort minimized, ease of handling increased. A preventable maintenance schedule should be set up.

Safety of workers is given at least

as much consideration in mines of this country as in those of any other nation, said Dan Harrington, formerly chief of the Bureau of Mines' Safety and Health Division, in talking on "Safety in Metal and Nonmetallic Mineral Mines." Nevertheless, accident statistics show that this industry is one of the most hazardous of all occupations despite the progress made in accident prevention throughout industry as a whole.

Making Men Understand

More effort must be directed in safety work to the specific job hazards, said R. H. Ferguson, manager of safety, Republic Steel Corp., Cleveland. Most injuries come from failure of the individual, not from failure of equipment and lack of guards. They come because men do not understand and anticipate the hazard. The speaker put forward several ideas which have been found helpful in making sure that the members of the safety staff are understood when they talk.

Kennecott to Participate in Gold Exploration

Through a newly incorporated company with capital of $4 million, to be known as Kennecott Anglovaal Exploration Co., Ltd.. Kennecott Copper Corp. will cooperate with the Anglo-Transvaal Consolidated Investment Co., Ltd., to develop new gold fields in the Orange Free State.

Major Lead Strikes Settled in Mexico

Strikes against major lead-producing companies in Mexico, which have seriously handicapped the industry during the spring, were settled by the end of May. The two-month strike at the San Francisco Co.'s Mexican mines was ended on May 24. On May 26 the American Smelting & Refining Co., whose Parral mine resumed operation early in May following a strike, reached a settlement with strikers at the Santa Barbara mines.

Canadian Gold Bonus Now in Effect

The Emergency Gold Mining Assistance Act, which passed the Senate and House of Commons early in May, went into effect on June 15 with final announcement of regulations. Briefly, the Canadian Government will aid gold mines to the extent of 50% of cost of production in excess of $18 an oz., retroactive to January 1. To qualify, a mine must produce more than 50 troy oz. of gold a year, and this must represent at least 70% of total value of the mine's products.

19th Annual Meeting of Idaho Mining Association Is Held at Sun Valley May 31 Through June 2

The annual convention of the Idaho Mining Association was held at Sun Valley, May 31 through June 2, with about 230 mining men in attendance. The opening session was welcomed by Harry Marsh, secretary of the Association, and presided over by J. B. Haffner, president. Greetings were extended also by Attorney General of the State, Robert Smiley, and William Reinhardt, vice president of Union Pacific R.R.

W. T. Nichols, Westvaco Chemical Corp., New York City, discussed recent progress of the chemical industry, Westvaco's part in the progress, and the manufacture of elemental phosphorus from phosphate shales at the company's new plant at Pocatello. Dr. Carlton D. Hulin, University of California, described types of ore deposits occurring in Idaho, stressing the significance of deep-seated ore bodies under development in the Kellogg-Wallace area. Recent legislation affecting mineral deposits in stream beds was explained by Oscar W. Worthwine, attorney, of Boise.

In the forum discussion following, John D. Bradley, Bradley Mining Co., covered the present status of the antimony industry and predicted that supply of the metal will be short for several years. Leland Waggoner and Walter Ziebell, of Rare Earths, Inc., spoke on monazite; J. R. Simplot, Simplot Fertilizer Co., on phosphate mining and fertilizer production; Robert L. Ziegfeld, Lead Industries Assn., and Wallace G. Woolf, Sullivan Mining Co., on the statistical position of lead and zinc; Robert E. Sorenson, Hecla Mining Co., on the deep developments in the Coeur d'Alenes. Dr. Donald H. McLaughlin, Homestake Mining Co., in discussing gold, suggested minting of authenticated gold coins by the Government for sale to citizens to test real value of current paper currencies. J. A. Mecia, Ima Mines, forcefully told the story of tungsten production and consumption and the effect of recent tariff reduction on prices.

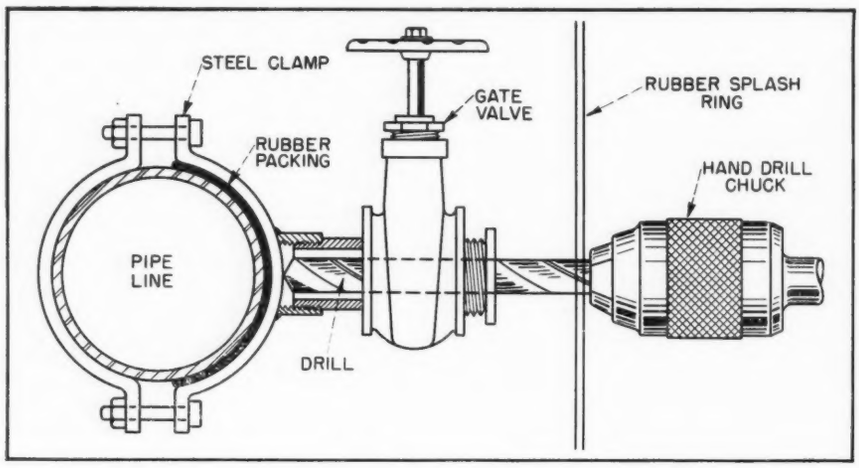
Tuesday's technical session was presided over by H. G. Washburn, mining engineer of Seattle, Wash. Dr. Donald McLaughlin pointed out the burden placed on the mining industry by growth of population and increased demand for goods and machines. He recommended stockpiling of imported metals, payment of higher-than-world price for scarce metals to encourage exploration and, above all, tax reform. John Parks Davis, attorney, San Francisco, in a paper entitled "Atomic Minerals—The Bomb and the Bear," expressed doubt that a successful settlement of control of atomic weapons can be reached in the near future. E. B. Douglas, Calera Mining Co., told of current operations, development in progress, and research work under way at the Blackbird cobalt-copper mine, Forney, Idaho. Jean McCallum, Texas Mining and Smelting Div., National Lead Co., reported the experience of his company in the Tri-State with aluminum dust treatment of silicosis. Dr. L. C. Cady, Research Div., University of Idaho, explained some of the 300 active projects under consideration by the agricultural, mining, engineering and forestry divisions at the University.

Oscar Worthwine presided over the technical session on Wednesday, at which Ira B. Joralemon presented his paper, "Who Has the Gold?", a new approach to the gold problem. (See page 76.) T. E. Roach, Idaho Power Co., spoke on availability of electric power and new generating facilities to be constructed in the State by his company, which expects to spend some $55 million on new generating plants and transmission lines by 1950. Max Yost, secretary of Associated Taxpayers of Idaho, read a paper entitled "Idaho Taxpayers and What to Do About Them," after which Eldon Beck, Idaho Power Co., described the work of the Idaho Safety Council. Following Mr. Beck's talk was the announcement of J. B. Haffner's re-election as president of the Idaho Mining Association.

Among resolutions passed by the Convention were the endorsement of a tariff policy to protect domestic industry from foreign competition; a public land policy to foster mineral production by private enterprise on the public domain, and to oppose attempts to nationalize mines or to extend the government leasing system to cover lands valuable for minerals and metals; a reform of our tax system to insure investors in mining ventures a return commensurate with the risk undertaken; the construction and maintenance of mine access roads; a currency with a metallic base using gold and silver, and repeal of the prohibition on the free circulation of gold; increased appropriations to the Federal Bureau of Land Management to facilitate in regional offices more rapid handling of applications for leases on public lands, and greater authority for regional offices in the granting of these leases. The convention went on record as being opposed in peacetime to incentive production payments for metals in excess of market prices, but recognizing that under emergency conditions production incentives, including but not limited to maintenance of manpower, tax reforms, payments of premium prices and subsidies may be advisable. Immediate decision of this question by defense authorities was urged because of the necessary legislation it might involve.

Continued on Page 151

OPERATING IDEAS



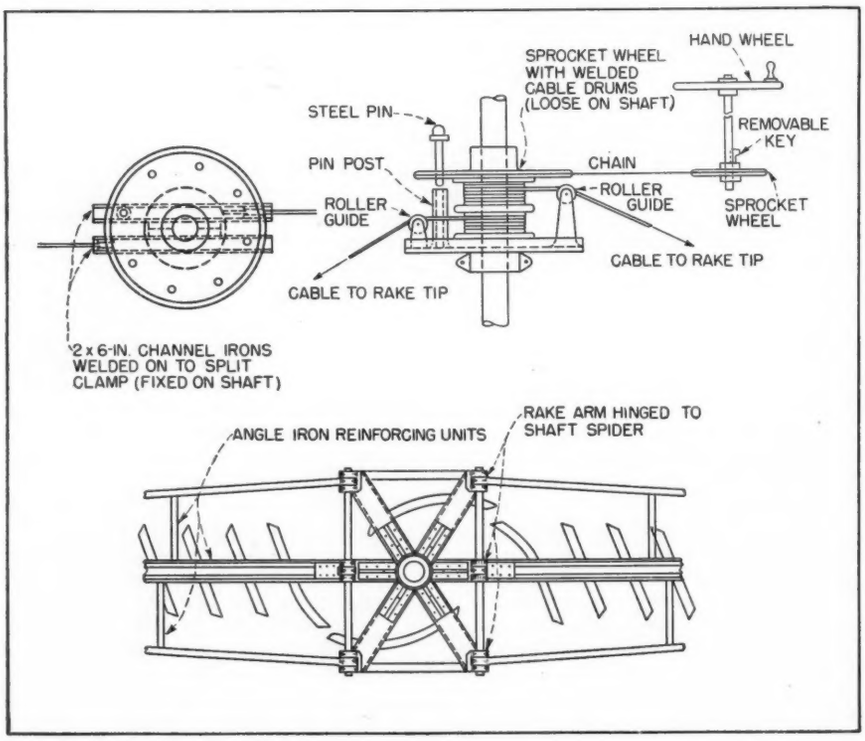
How to Make an Auxiliary Pipe Connection Without Draining the Water System

Frequently the mine, mill or smelter repair department is called upon to install an auxiliary pipe line for drainage or measuring purposes, or a connection for a pressure gage. If the line can be drained, the job is comparatively simple. If the line cannot be drained, the following method will prove helpful:

Parts required to make the connection include a steel clamp, a gate valve connected to a short nipple welded on to one-half of the steel clamp by means of a short bushing, and a pipe bushing at the open end of the gate valve to guide the drill. After these parts have been installed as shown, a hole is drilled through the pipe. The moment the drill penetrates the pipe, it is quickly retracted, and the gate valve closed. A rubber splash ring placed around the drill bit will prevent water from dousing the workman while the gate valve is being closed.

Installation of additional pipe lengths or gages can now be made with ease. By using this method, the time and expense of draining the pipe system, and recharging it can be saved. The job itself requires about one hour, which is much less than would be required if the connection were made in the conventional way.

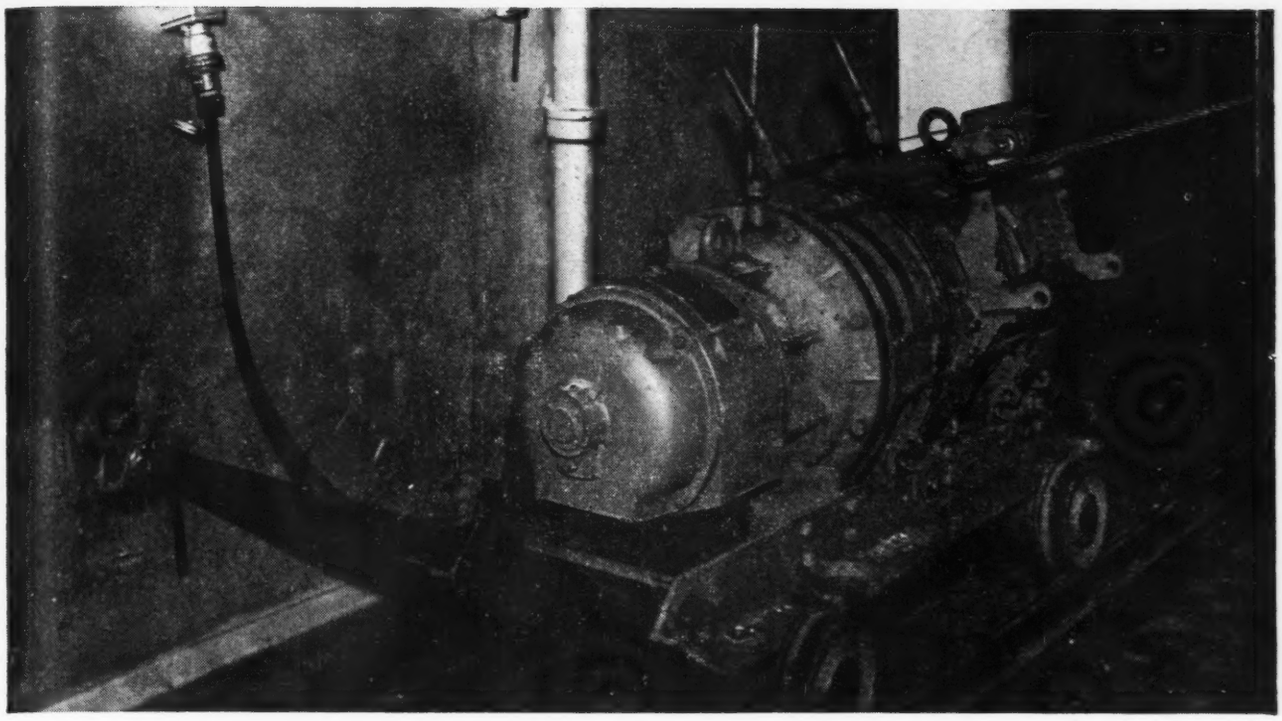
Hinged Rake Arms Improve Thickener Operation



Ordinarily modern thickeners are equipped with protective devices to prevent breakage of rake arms due to possible overloads. However, in the absence of such a device, W. H. Nagel, plant superintendent, Donovan mill, Silver City, Nevada, modified the design of a thickener as shown here to prevent twisted shafts and broken rake arms during overload periods. Six hinge units, three on each side of the shaft, were used to attach the thickener arms. Then the rake arm was strengthened by the installation of vertical and lateral steel bracing. Cables to respective drums of a winding unit were then attached to steel eye-bolts at the ends of the arms.

The winding unit consists of a fixed base made of channel irons welded to a sturdy split clamp for attachment to the thickener shaft, and a steel sprocket wheel with cable drums welded to the lower flat face which operates loose on the shaft. The fixed base also contains two cable guides and a pin lock post. A chain connects the sprocket wheel with drums to the small sprocket wheel on the handwheel assembly.

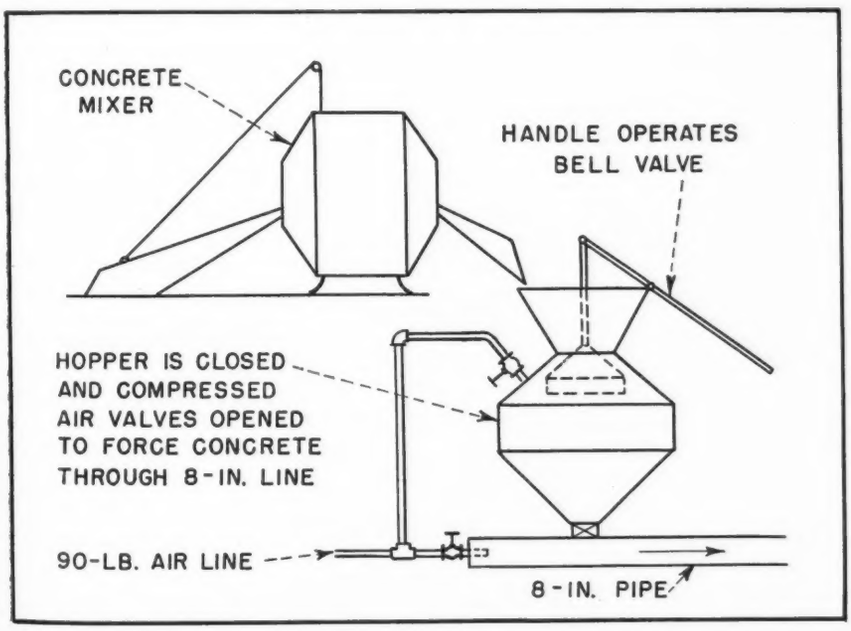
When the arms have been lifted to the desired height, the steel pin is dropped into the pin lock post on the lower base. Then the thickener drive motor is started. In event of a serious overload, the pin is removed and the arms are raised rapidly by turning the handwheel.



Mobile Hoist Serves Several Working Places

The track-mounted hoist shown here was used in an industrial plant where intermittent hoisting was required at several working places. The truck was anchored as shown.

In a Western metal mine this same idea was used to enable a double-drum, air-operated hoist to serve raises to several stopes situated above the same mine level. The mine truck was temporarily anchored to the track by means of a sprag which was wedged between the top of the truck and a convenient mine timber.

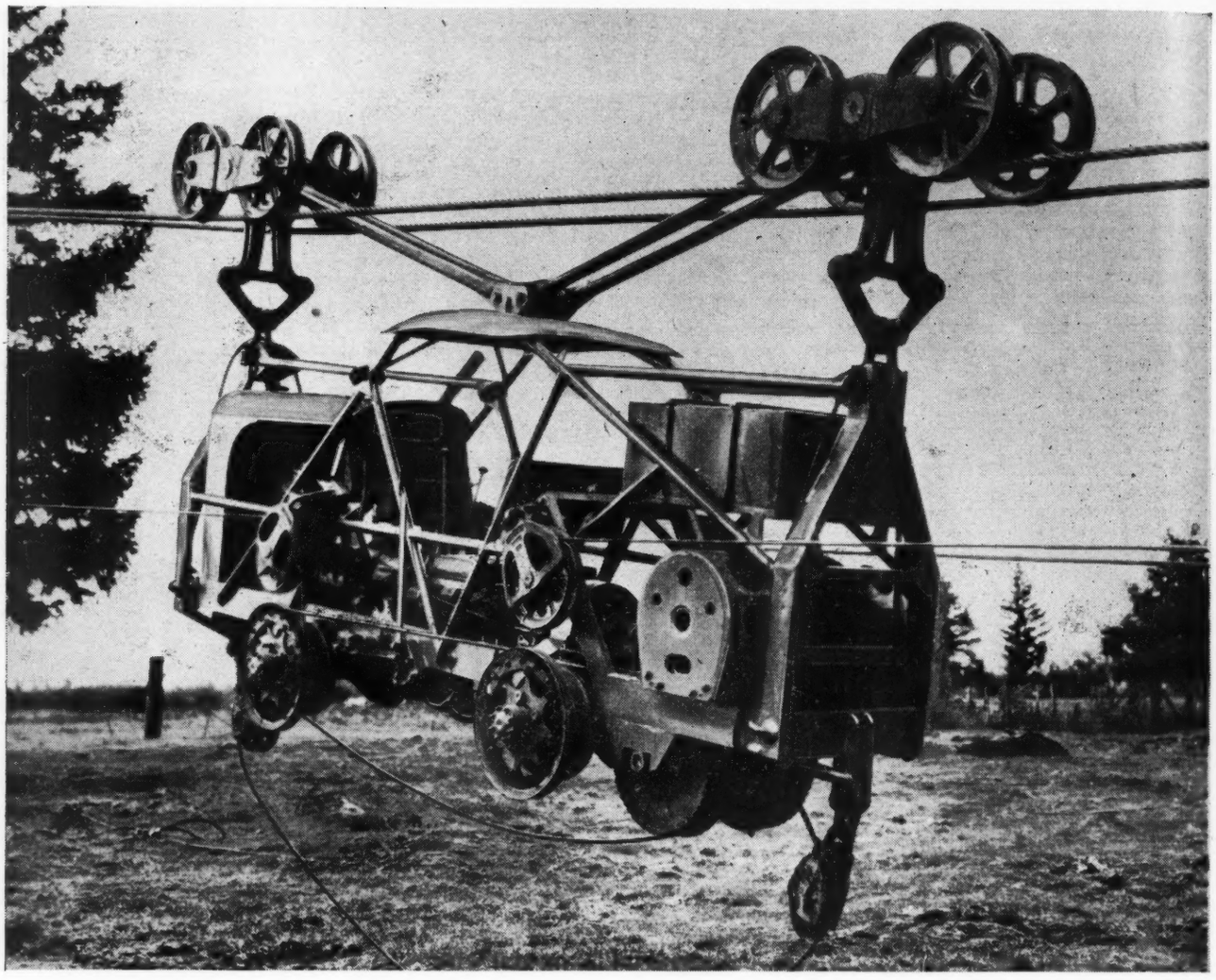

CONCRETE MIXER
HANDLE OPERATES BELL VALVE
HOPPER IS CLOSED AND COMPRESSED AIR VALVES OPENED TO FORCE CONCRETE THROUGH 8-IN. LINE
90-LB. AIR LINE
8-IN. PIPE

Pumped Aggregate Speeds Mine Construction

Concreting of ore bins, ore passes, bulkheads, and similar construction work in the mine of Andes Copper Mining Co., Potrerillos, Chile, has been greatly facilitated by a system of pumping concrete aggregate over long distances by means of compressed air. The concrete mixer, a ¼-cu. yd. model, is set up near the level station, or at some other convenient spot, then the mixed concrete is pumped in batches through an 8-in. pipe along drifts and up raises.

In addition to the mixer, a hopper is required, which has the general shape shown in the sketch. It should be large enough to hold one charge of the mixer; when the mixer is dumped into it, the hopper is closed with the upper bell valve. Then high pressure air at the hopper's top forces the concrete down into the 8-in. pipe. The air is then turned on at the valve in the end of the pipe, and the mix is on its way.

The pipe usually discharges into a wooden box and not directly into the forms. If the pipe leads up a raise, a rubber hose, bent in a semicircle, is placed on the end of the pipe to lead the concrete into a box. The mix is then puddled a little in this box, and shoveled through a hole into the forms. Concrete aggregate has been pumped in this way 125 ft. up a 62-deg. raise without difficulty, and it could have been pumped farther if necessary.



TWO TRACTION SHEAVES on each side of carriage engage traction cables to move unit at speeds up to 35 miles per hour.

The "Skyhook"—A New Transportation Unit

IN THE LUMBERING INDUSTRY, where road maintenance and construction is often exceedingly difficult, ingenious engineers have developed a "skyroad" of steel cables from which self-powered cars (see above) are suspended. These units can lift several tons of logs, and whisk them out of the forest at speeds up to 35 m.p.h., around 30-deg. bends and up grades of 40 deg. or more if necessary. Rain, snow, or rough terrain are no obstacles. This unit, called the "skyhook", and rigging appliances are made and engineered by Pointer-Willamette Co., Inc., Portland, Oregon. Wire rope cables for the equipment are supplied by John A. Roebling's Sons Co., Trenton, N. J.

A number of American mining companies and foreign operators are at present considering adapting this equipment to mining for such work as tailings handling, timber handling and open-pit projects. Other industries including oil, and sugar cane growers are now using installations for materials handling.

The gasoline-powered carrying unit is suspended from two cables by four 2-wheeled dollies. Engineers have emphasized safety in design of the equipment. Accordingly, if any two dollies jumped the cable, the remaining two would continue to carry the unit safely. In fact, only one dolly is adequate to support the car in an emergency. Each cable is capable of supporting 3.3 times the weight of the car plus load. Stabilizing devices keep the car level if dollies should jump the cable.

Two rubber-lined traction sheaves on each side of the car engage stationary traction cables. Each traction cable is in contact with 320 deg. of arc on each of the two traction sheaves which it engages. Thus motive power is transmitted positively through a fluid-coupling clutch and four-speed transmission with direct reverse. Special interaxle differentials are used to take care of unequal loads on the sheaves. A guide sheave is used to feed each traction sheave.

Motion of the carriage is controlled by an operator who rides the unit. Loads are lifted with a four-speed hoist. The "skyhook" can handle a skip, clam shell bucket, dragline bucket, electromagnet, or slings and tongs. Present models handle 5 to 10 tons, but engineers estimate that 10 to 20-ton capacities are well within practicable limits.

The skyroad is supported by trees, poles or towers at intervals of 500 to 2,000 ft. The carriage may be equipped with rubber tired wheels and travels on its own power on ground. Thus it can act as its own rigging unit. Several carriages may be used on the same "skyroad," provided no two occupy the same span between supports at the same time. Life expectancy of the wire rope used by the "skyhook" is from 5 to 10 years.

Time savers . . . cost cutters

Battery-powered haulage units and *EXIDE-IRONCLAD BATTERIES*

With battery-powered trammers, locomotives and shuttlecars on the job, you can speed up production, cut haulage costs and get trouble-free performance day after day. And when Exide-Ironclad Batteries supply the motive power, you can count on full shift availability, lower power and maintenance costs, and longer battery life. Exide-Ironclad Batteries are the preferred power for mine, quarry and tunnel haulage units because they are the batteries with all four of these vital characteristics—high power ability, high electrical efficiency, ruggedness and long life.

Save haulage time. Cut haulage costs. Get better haulage service. Use battery-powered equipment and dependable Exide-Ironclad Batteries.

1888 . . . Dependable Batteries for 60 years . . . 1948

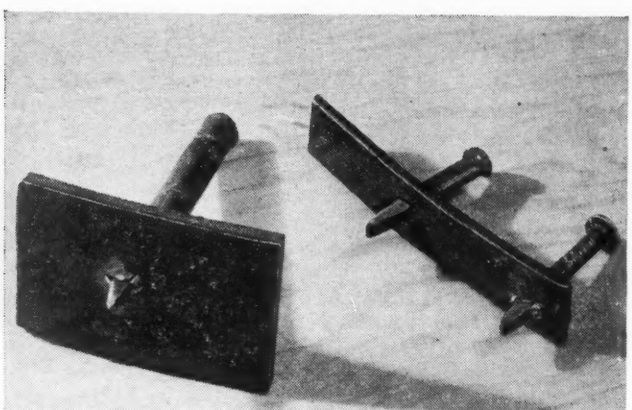
If you have a special battery problem, or wish more detailed information, write . . .

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

LOW-CARBON STEEL is hardened with powder and used to shave off corners of a section of an old automobile leaf spring.

WIRE NAIL is fashioned into chisel, hardened with powder, and used to chisel off section of 18 and 8 stainless steel.

New Compound Hardens Steel



HARDENED REINFORCING ROD is driven through cold 3/16-in. steel. Wire and cut nails (right) are driven through 1/8-in. steel.

DEEP PENETRATION of cutting tools, dies, taps and reamers is possible with a new steel hardening compound called "Hi-Speed-It", which contains no cyanide and is non-poisonous. Ordinary wire nails and common reinforcing rods can be hardened to such a degree that they can be driven through cold steel plate as shown in the accompanying illustrations. Low carbon steel can be fashioned into a chisel, hardened, and then used to cut spring steel or stainless steel as shown. Because of these unusual qualities, it is believed that the powder may be useful in the mining industry for such purposes as hardening picks, shovels, moils, and possibly other rock cutting tools and bits. In other industries, the powder is being used increasingly in machine shops of all types.

No special equipment is needed to apply the powder. A novice can learn the technique in a few minutes. Procedure is as follows: Heat the tool (or instrument fashioned from low-carbon steel) to cherry red heat, (1400 to 1700 deg. F.) Then dip the cutting end of the tool into the powder, and hold it there for 15 to 30 sec. A film of powder will partially fuse and cling to the tool. Then reheat it to cherry red. At this point the powder appears to fuse and spread evenly over the treated surface. Metallic constituents of the powder actually seep into microscopic pores of the steel being treated. Then quench quickly in cold water. The tool quenches clean, leaving no scale, and is ready for use.

If deeper penetration is required, the tool may be dipped into the powder a second or third time before final quenching. Even high-speed tools can be improved by this process. In this case the tool is brought to white heat (1800 to 2200 deg. F.), similarly dipped, fused, and quenched in oil. The compound can also be used in pack hardening.

In a recent test at Columbia University, a 3/16-in. carbon drill, thus hardened, was capable of drilling file tangs at 15 sec. per hole. In another demonstration, pictured above, common wire nails were hardened and used to cut spring steel and stainless steel. Another piece of low-carbon steel was treated and used to drill sandstone.

Constituents of the steel hardening compound are not disclosed. The product is manufactured by the Necamp Metallurgical Laboratories, 1 Mercer St., New York 13, N. Y.

"KEY PEOPLE"—*When You Need Steel*

Ryerson's function is not only to supply your steel, but to deliver it on time. From the moment the Ryerson switch-board flashes your incoming call until the steel is laid down in your plant, a corps of helpful, intelligent employees well-trained in the Ryerson "Immediate Steel" tradition are at your service.

The likeable young women at the switch-board, phone-order salesmen, dispatchers, crane operators, skilled warehousemen who cut, shear and shape stock sizes to fit your specification, truck drivers—all of them are key people at Ryerson—key people in your service, when you need steel!

In spite of shortages, we are putting forth every effort to serve all Industry to the best of our ability. Naturally, many sizes and certain products are out of stock. However, for the most part you can depend on Ryerson for immediate shipment of a wide range of steel products.

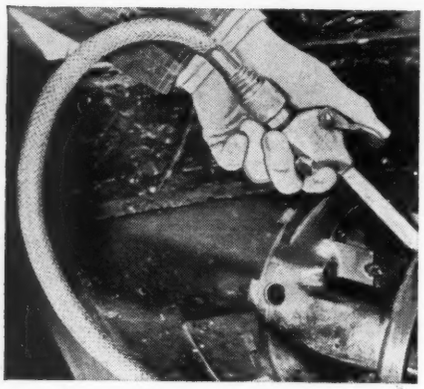
PRINCIPAL PRODUCTS

Bars—hot and Cold rolled	Mechanical Tubing	Tool Steel
alloy steel	Boiler Tubes and Fittings	Wire, Chain
reinforcing	Allegheny Stainless—	Bolts, Rivets
Structurals	sheets, plates, shapes,	Babbitt
Plates—	bars, tubing, etc.	Metal Working Tools
Inland 4-Way Floor Plate	Sheets and Strip Steel	& Machinery, etc.

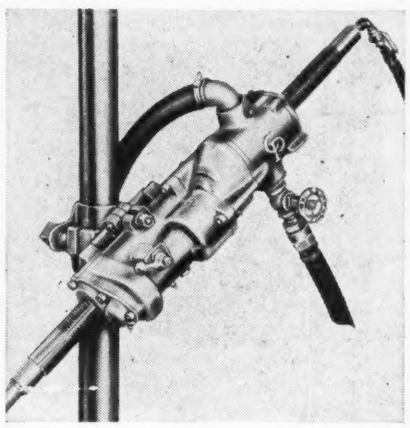
JOSEPH T. RYERSON & SON, INC., Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles

RYERSON STEEL

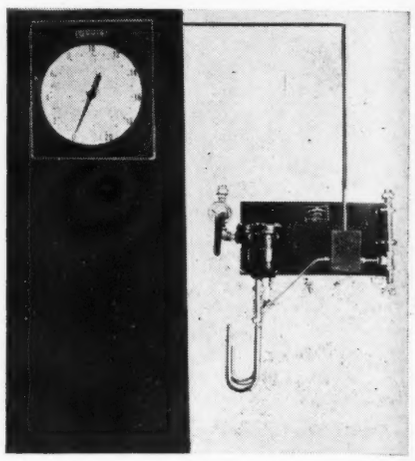
EQUIPMENT NEWS



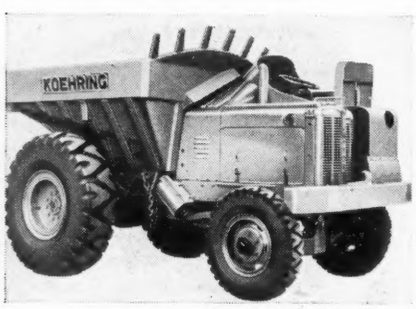
Ronaflex Tubing Co., Inc., Philadelphia, Pa. announces a synthetic rubber hose which will withstand high pressures and internal and external corrosive action of solvents and fumes. Standard sizes range from 1/4 to 2 in. Its rugged construction and resistance to attack by lubricating oil suggest use of this hose for air-operated mining equipment.



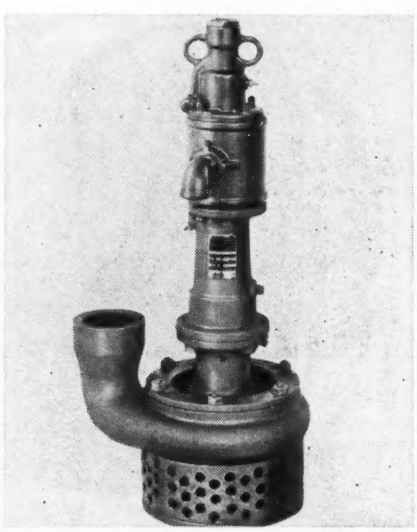
New air motor on Chicago Pneumatic Tool Co.'s new CP-55 diamond drill develops 25% more power than the No. 5 motor of identical size on the CP-5 companion model. For more information, write the company at 6 E. 44 St., New York 17, N. Y. Request Bulletin 318.



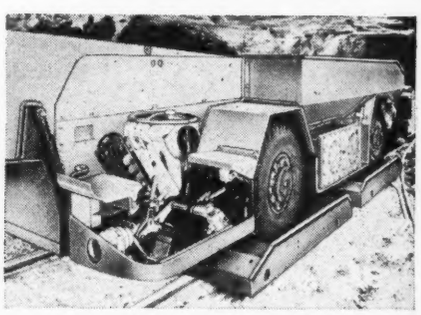
This flue gas analyzer checks composition of stack gases and gives a continuous indication of the completeness of combustion. It is made by Davis Emergency Equipment Co., 45 Halleck St., Newark 4, N. J.



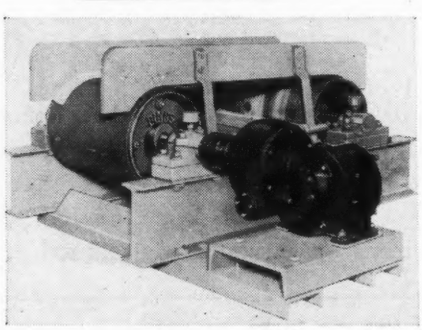
New 6-yd. Koehring Dumptor features controlled gravity dump. A 12-yd. unit is also being made by the Koehring Co., Milwaukee, Wis.



Developed by Bryon Jackson Co., Los Angeles, Calif., this pneumatic sponge pump will handle water bearing sand and pulverized rock up to 5/8 in. in diameter. The air motor has a governor and variable speed control.



Shuttle car transportation is simplified with this compact 5 7/8-in. high shuttle car carrier which fits on mine tracks as shown. For further information write to Phillips Mine and Mill Supply Co., Pittsburgh 3, Pa.

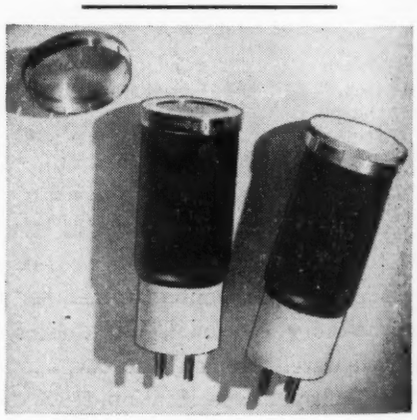


Magnetic Pulley-Type Separators

A complete line of self-contained horizontal and inclined, magnetic, pulley-type separators incorporating Alnico magnetic, Perma-Pulley, idler pulley, endless belt and drive has been announced by Dings Magnetic Separator Co., Milwaukee, Wis. The units are designed to remove tramp iron. They are available with belts ranging from 12 to 60 in. in width and of any desired length.

Steel Hardening Compound

The steel hardening compound called 'Hi-Speed-It" which is described on page 110, and can be used for deep-penetration hardening of low-carbon steels, and also for improving performance of high-carbon steel tools, is manufactured by Necamp Metallurgical Laboratories, 1 Mercer St., New York 13, N. Y. It is available in 2 and 5-lb. tins, and in 10, 25 and 50-lb. drums. Base price is $14 per lb. f.o.b. New York with discounts for 25 lb. or more.



Geiger Tubes

Beta-gamma, end-window geiger tubes, shown above, have been developed by Tracerlab, 55 Oliver St., Boston 10, Mass. Types TGC-1 and TGC-2 are fitted with thin mica windows and are suitable for detection of low energy emitters like carbon-14.

(*Continued on p. 114.*)

NEW MACK hauls 22½ ton pay loads

It's "bottoms up" with heaping loads and "profits up" through low-cost hauling when Mack Model LV takes over on tough excavating and strip-mining jobs.

Clear through, in every part, this big, new Mack is engineered to move more yardage per load and more loads per hour.

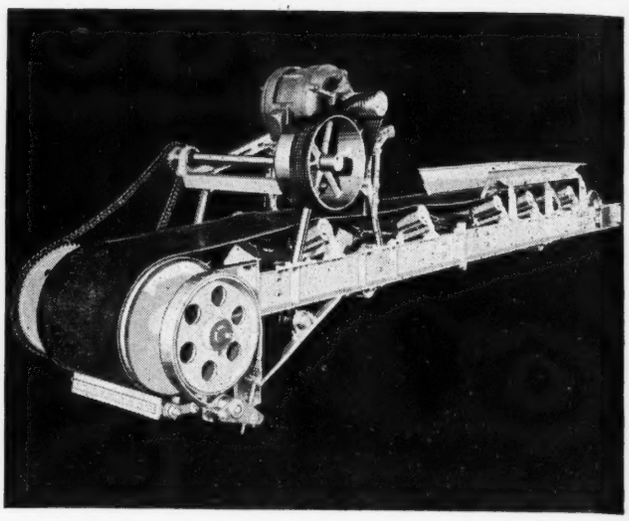
There's power in abundance with its 200 h. p. diesel engine. Massive strength in its reinforced, alloy-steel, all-welded frame. Assured traction with Mack's exclusive Power Divider.

Mack Duplex transmission gives added mastery over grades and difficult terrain. Power steering and air assist clutch contribute to easy handling and high maneuverability. Final reduction of full-floating Planidrive type, is strong and rugged without excessive weight. Roomy, all-steel cab has offset driver's seat for better vision; is durably built for long-lasting comfort. Planned accessibility means lower maintenance, easier servicing.

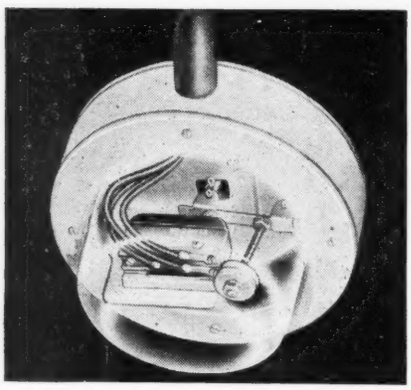
Mack off-highway engineers will gladly advise you on the proper application of Model LV to your particular excavating job. Write or call your nearest Mack branch or dealer.

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts. In Canada, Mack Trucks of Canada, Ltd.

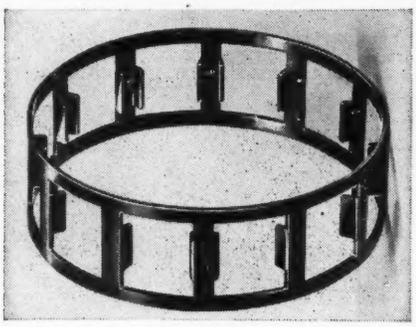
New silicone glass insulated dry-type network transformer announced by Westinghouse Electric Corp. contains no inflammable oils and eliminates fire and explosion hazards. The transformers are filled with dry nitrogen permanently sealed in place.

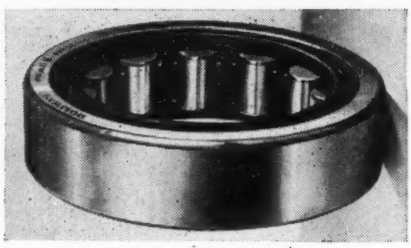


New standardized channel-frame conveyor announced by E. F. Marsh Engineering Co., St. Louis, Mo. Basic units can be interchanged on varied installations. Terminals and intermediate sections are pre-fabricated. For further information write for Bulletin MB-2.



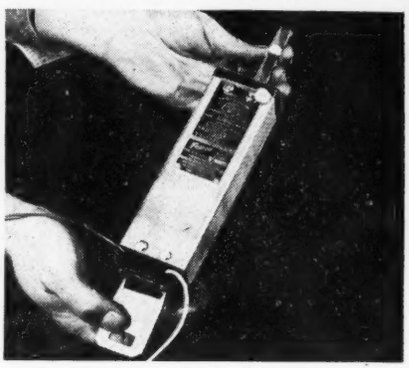
Bantam Bin-Dicator is a diaphragm-operated switch for level control of material in chutes, hoppers, and conveyors. For further information write to Bantam Bin-Dicator, 14615 E. Jefferson Ave., Detroit 15, Mich.





Precision Roller Bearings

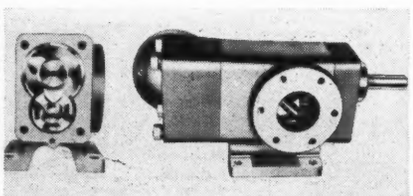
A new precision cylindrical roller bearing with steel retainer has been announced by the Rollway Bearing Co., Inc., Syracuse, N. Y. The new bearing features a one-piece steel retainer with pockets having broad double flanges in which the rollers are kept in alignment, as shown above. For further information write the company for Catalog No. 847.



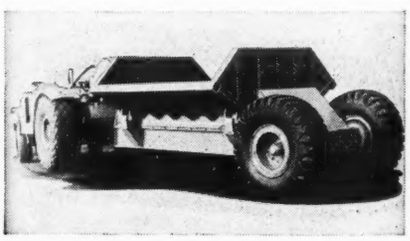
This new 10-shot firer weighing little more than a pound may be carried in an operator's belt. It is equipped with a safety key. The unit is made by Farmers Engineering and Manufacturing Co., Pittsburgh 21, Pa.

Thirty-Ton Truck

The Model LD rear-dump Euclid truck shown here is hauling a 30-ton load of overburden. A 275-hp. diesel engine provides power for hauling payloads of 60,000 lb. over rough haul roads. Top speed for this 19-cu.yd., struck-measure capacity truck is 20 miles per hr. A hydraulic steering booster is standard equipment on this model.



Two helical rotors of this oil pump force 50 to 75 gal. of oil per min. at pressures up to 125 psi. The unit is made by the Syntron Co., Homer City, Pa.



Athey Products Corp., Chicago 10, Ill., introduces this new PD-10 rubber-tired quarry trailer for use with the Caterpillar DW10 tractor. Tires of the trailer and tractor are interchangeable.

Ventilation Tubing

The new vinyl plastic-coated Mine-Vent ventilation tubing now offered by American Brattice Cloth Corporation, Warsaw, Ind., is said to be flameproof, highly resistant to wear, mildew proof, and impervious to moisture. The new tubing is also flexible and light in weight. It is available in two

Photo by Bureau of Reclamation

3 SHAPES
ALL SIZES

Stands up longer and makes more hole at lower cost per foot

The reason why Crucible's hollow drill steel is used on the big jobs is because it makes more hole for less money. For the past 50 years, Crucible's drill steels have been proving that they cost less to use wherever rock must be drilled in construction, mining, and quarrying.

- Such economy is the result of high quality and uniformity, checked by mill inspections and severe tests of every lot prior to shipment. *Your* Crucible hollow drill steel will have excellent shank qualities, resistance to fatigue, uniformity of analysis and structure, concentricity of hole, and stiffness and [illegible] section.

Crucible's hollow drill steel is available in both carbon and alloy types—Crusca, "Park A" Alloy, and Crusca (CA) Alloy—in three shapes and in all sizes. Other Crucible steels for contractors, miners, and quarrymen are alloy and Max-el machinery steels, high speed tool bits, alloy and carbon tool steels and Rexweld hard surfacing welding rods. Ask your Crucible steel salesman about hollow drill steel or any of your other steel requirements. Crucible makes a full range of quality steels for industry.

Write for catalog on the steel best suited for your particular job

CRUCIBLE STEEL Company of America

"FULL-RANGE" QUALITY STEELS for INDUSTRY

HIGH SPEED · TOOL · STAINLESS · ALLOY · MACHINERY · SPECIAL PURPOSE STEELS

Chrysler Building, 405 Lexington Ave., N. Y. 17, N. Y.

Branches, Warehouses, and Distributors in Principal Cities. Consult your Telephone Directory or Thomas' Register for Nearest Office

400° F. ABOVE
EFFECTIVE LUBRICATION AT MOST ANY TEMPERATURE
70° F. BELOW

The fact that LUBRIPLATE Lubricants are able to meet extreme temperature conditions, demonstrates the ability of these products to cope with the wide variations often found in everyday industry. Besides this feature LUBRIPLATE Lubricants possess attributes not found in conventional lubricants. Write for literature.

LUBRIPLATE
Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

LUBRIPLATE
Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

LUBRIPLATE
Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

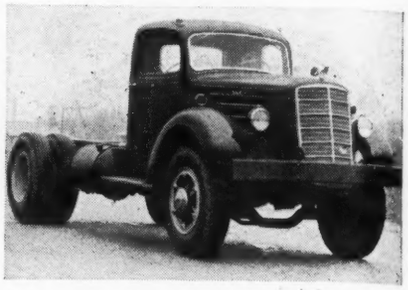
LUBRIPLATE
FISKE BROTHERS REFINING CO.
NEWARK 5, N. J. TOLEDO 5, OHIO
DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

Equipment News (*Continued*)

grades the No. 14, with a jute fabric base, and the No. 15, with a cotton duck base. The latter is recommended for use in severe acid or heat conditions.

Drafting Machine

The new Equipoise Drafting Machine announced by the Charles Bruning Co., Chicago 41, Ill., has been improved to assure accurate alignment at all times even though the board may be inclined as much as 20 deg. from the horizontal. A revised protractor head permits greater convenience in operation, and a base-line setting device for locking the protractor index point to any angle has been improved. It is claimed that this instrument may save as much as 19 to 20% of a draftsman's time.



Designed for high-speed tractor operations, this 45,000-lb. Model EQT Mack unit is equipped with a 139-hp. engine. Standard models come with 5-speed transmission. Optional equipment has 10-speed transmission.

Newly announced 6-cu. yd. S-68 Bucyrus Erie S-Type scraper working with an International TD-14 crawler tractor. The S-68 is equipped with a hinged apron with adjustable opening for clean discharge of sticky material.

INDUSTRIAL NOTES

Littleton C. Barkley has been appointed general sales manager, Asbestos and Rubber Products, West Coast Division, **Raybestos-Manhattan, Inc.**

Mervyn W. Martin has been appointed sales representative in California and Nevada by the **Marion Power Shovel Co.** of Marion, Ohio.

John T. Ryan, Jr. has been elected executive vice president of **Mine Safety Appliance Co.**, Pittsburgh, Pa.

Louis W. Huber has been elected vice president of **National Mine Service Co.** He will be in charge of the firm's operations in Kentucky, Tennessee, Illinois and Indiana, with headquarters in Lexington, Ky.

D. R. Anderson has been appointed branch manager for the **Euclid Road Machinery Co.** His headquarters will be at the company's branch office in Hibbing, Minn. **J. M. Fairbanks** will succeed Mr. Anderson as service manager for the company.

A. William McGraw has been appointed representative for the **Marion Power Shovel Co.** in sections of Missouri, Illinois and Kentucky. His headquarters will be at the district offices of the company in St. Louis, Mo.

Eugene D. Bishop has joined the mining department of **Firth Sterling Steel & Carbide Corp.**, McKeesport, Pa. as special representative in the development and sale of rock bits tipped with Firthite, a sintered carbide. His headquarters will be in Boulder, Colo. with **William Loach**, manager of the company's mining division.

G. B. Wright has been appointed sales engineer in the Small Engine Dept., Heavy Machinery Division, **Nordberg Manufacturing Co.** Milwaukee 7, Wis.

The Richmond Division of Gar Wood Industries is now producing dump truck bodies according to **James B. Steed**, division manager.

Franklin F. Bogardus, district sales manager for **Roots-Connersville Blower Corp.**, Connersville, Ind., has opened an office in Cleveland, Ohio, and will handle the same territory previously handled from the factory.

F. X. Ferney has been appointed assistant sales manager of the **Bird Machine Co.**, South Walpole, Mass.

John W. Crossett has joined the Development and Research Division of the **International Nickel Co.** at New York.

The **Moorhead-Reitmeyer Co.**, 30th & Brereton Sts., Pittsburgh, Pa., has changed its name to the **Moorhead Electrical Machinery Co.** The company will continue buying and selling mining and power equipment.

BULLETINS

Aircraft for Business. Business men in many fields including mining testify to the advantages of aircraft in a brochure, "The Air Fleet of American Business," recently released by the Beech Aircraft Corp., Wichita 1, Kansas.

Floor Resurfacing. "Over the Rough Spots" is the title of a pamphlet describing methods of patching holes and rough spots in floors. For a copy, write to the Stonhard Co., 401 N. Broad St., Philadelphia 8, Pa.

Earth Moving Equipment. The Heil Co., Milwaukee 1, Wis., offers the following bulletins: No. RM48028, "Open-top Twin-Cable Scrapers"; No. BH47108, "Heavy-Duty Dump Bodies and Twin-Arm Hoists"; and No. BH 4663 "Twin-Arm Hoists for Heavy-Duty Trucks."

Earth Moving Equipment. LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa, recently issued a booklet illustrating and describing the new TS-300 motor scraper. Write for Form No. A1154.

Pumps for Abusive Service. Bulletin No. 4711, just released by Nagle Pumps, Chicago Heights, Ill., presents recent developments in horizontal and vertical shaft centrifugal pumps. Applications include pumps for abrasive, hot, corrosive, and heavy mixtures or solutions.

Water Treatment. Permutit Co., 330 West 42 St., New York 18. N. Y., has issued a leaflet describing the properties of Zeo-Karb, a non-siliceous zeolite which is made by properly treating granulated bituminous coal. When regenerated with acid or salt, it removes calcium, magnesium, and sodium from water.

Electric Cable Hoists. Lisbon Hoist and Crane Co., Lisbon, Ohio, announces a new line of "Bob-Cat" electric hoists.

Fire Extinguishers. Ansul Chemical Co., Marinette, Wis., offers a catalog describing the complete line of Ansul dry chemical fire extinguishers. The dry chemical is non-toxic, does not conduct electricity, will not freeze, and is non-corrosive.

Pocket Guide of Welding Electrodes. This useful booklet explains how to pick the right welding electrode. For a copy, write to Air Reduction, 60 East 42 St., New York 17, N. Y.

Construction Guide for Corrosive Fluids. Construction materials for nearly 400 corrosive fluids are recommended in Bulletin No. 97 offered by Fischer & Porter Co., Department 9R-L, Hatboro, Pa.

Magnetic Brakes. A folder describing Type M magnetic brakes can be obtained from Cutler-Hammer, Inc., 237 N. 12 St., Milwaukee 1, Wis. Ask for publication BR-2.

New Crusher. Smith Engineering Works, Milwaukee 12, Wis. describes and illustrates the new Telsmith Intercone Crusher in Bulletin No. 270A.

Advice to Welders. "Here Is Your Information" is the title of Bulletin AM-30 published by Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y., which contains concise information on welding rods for shop use.

Gear Motors. U.S. Electric Motors, Inc., 200 East Slauson Ave., Los Angeles 54, Calif., has released a colored booklet illustrating and describing U.S. Syncrogear motors ranging in sizes from 1/4 to 30 hp., and in speed from 10 to 10,000 r.p.m.

Cyanide Machinery. Morse Bros. Machinery Co., Denver, Colorado, announces publication of Bulletin C-48 on the company's complete line of machinery for cyanidation of gold and silver ores. Additional bulletins issued by the company recently included No. 475-R on rod mills, No. 475 on ball mills, and No. 4710 on continuous vacuum drum and disc filters.

Truck and Trailer Restrictions. Motor vehicle laws pertaining to sizes of trucks and trailers are presented in a booklet published by the Four Wheel Drive Auto Co., Clintonville, Wis. Laws for the 48 states are listed in tables.

(*continued on p. 152*)

SO VERSATILE

. . . because Schramm can furnish air for any compressed air job in your work; and versatile because there is a size and model Schramm to fit your individual needs! Just specify the size you need.

SO EASY TO OPERATE

. . . merely by pushing a button to start, and compact and lightweight enabling you to move the portable units wherever you like! Meanwhile, the stationary units take up very little room, are vibrationless and no trouble!

SO ECONOMICAL

. . . because Schramm can do *all* your compressed air jobs quickly and efficiently. Features that assure economy include 100% water cooled, forced feed lubrication, and mechanical intake valve.

it pays to use Schramm!

Your field has found that Schramm Air Compressors well fit its needs. And has specified Schramm everywhere . . . North, East, South and West. Write today for full data.

TOOLS FOR THE JOB

Schramm Inc. also has a complete line of Pneumatic Tools to offer and recommend for operation by their Compressors.

These include Rock Drills, Paving Breakers, Trench Diggers, Clay Spades, Backfill Tampers, Tie Tampers, Sheeting Drivers, Demolition Tools, Chain and Circular Saws.

Write for bulletins and prices.

SCHRAMM INC.

THE COMPRESSOR PEOPLE • WEST CHESTER • PENNSYLVANIA

PERSONAL NEWS

William P. Crawford, former assistant general manager, has succeeded the late **H. C. Henrie** as general superintendent of the Copper Queen branch of the Phelps Dodge Corp. **J. B. Pullen**, general superintendent of the United Verde branch at Clarkdale and Jerome, has been named manager of the Copper Queen branch. **C. E. Mills**, formerly mine superintendent, has been promoted to general superintendent of United Verde; and **W. W. Little** has been promoted from assistant mine superintendent to mine superintendent.

A. V. Trent, former assayer for the Tamarack and Custer Mining Co., has bought an interest in Goodall Brothers, Helena, Mont. The latter company, an assaying firm, represents operating companies which ship ores to smelters at Anaconda, East Helena, and Great Falls.

George Percival, Jr., of Rouyn, Quebec, is now mine foreman for the Cerro de Pasco Copper Corp.'s operations at Morococha, Peru.

W. R. Lindsay, consulting engineer, has left for British Guiana to begin an extensive development program for Cuyuni Goldfields, accompanied by **Frank Buckle**, who will superintend the work. Both men were previously associated with the Granby Consolidated Mining, Smelting and Power Co.

A. Chester Beatty ('98), prominent mining administrator and executive, was awarded the Egleston Medal for distinguished engineering achievement by the Columbia Engineering School Alumni Association. The medal was presented in recognition of his accomplishments in the low grade copper mines in this country, the exploration and mining of African diamond deposits, the exploration and development of the Northern Rhodesia copper fields, and the development of lead-zinc mines in Yugoslavia.

Robert F. Wilson of Virginia, Minn., who for two years has been safety supervisor for the eastern district operations of the Oliver Iron Mining Co., has been appointed to succeed the late **Byron G. Best** as supervisor of safety for the company, in Duluth.

B. T. O'Grady, who joined the British Columbia Department of Mines in 1920, retired in May.

LaMar S. Hills, Salt Lake City, Utah, has been named assistant superintendent of the mills ore haulage department of Kennecott Copper Corp., Utah copper division.

Blair Burwell, former vice president and general manager of U.S. Vanadium Corp., is now president of the newly formed Mineral Engineering Co., Grand Junction, Colo. The company is composed of mining and geological engineers who will give service in mine operation and refining of ores, anticipating widespread uranium mining in Western Colorado. **W. G. Haldane**, past president of the Colorado school of Mines, is secretary-treasurer, and **R. G. Sullivan**, formerly manager of the Boulder Tungsten Mills, is vice president and manager.

P. deHaart has been appointed chief inspector of mines of the Netherlands.

Prof. A. M. Bateman of Yale University spoke to the graduate students and faculty of the Geology Department, Columbia University, on Apr. 21. The subject of his talk was "Some Mineral Problems in the Present International Situation."

H. A. GRAY

H. A. Gray, vice president in charge of traffic, Eagle-Picher Mining & Smelting Co., has retired to attend to personal business interests. Mr. Gray came to Eagle-Picher in November, 1918. He was largely responsible for the successful transportation operations of the Eagle-Picher Mining & Smelting Co. in the Tri-State mining area and Mexico.

George W. Hallock was re-elected president of the California Hydraulic Mining Association. **F. E. Browne** was made vice president; **F. T. Wilmoth**, secretary; and **Guy W. Brundage**, treasurer.

Williams S. Martin, formerly an engineer with Metals Reserve Co., International Nickel and Braden Copper Co., is now vice president in charge of operations for Western Metals and Trading Co., 44 Wall St., New York. This is a newly formed organization, affiliated with Volcan Mines Co., Lima, Peru, to purchase machinery and supplies in this country and to buy South American concentrates for resale in the United States.

Dr. Robert S. Lewis, head of the department of mining at the University of Utah, has retired. Dr. Lewis, who joined the Utah faculty in 1912, plans to devote some time to writing technical articles.

Edgar A. Scholz is no longer associated with the Ruby Gulch Mining Co. **Millard L. Reyner**, mining engineer, has taken over management of the property.

Frank A. Buchella, who was assistant general manager of Chino Mines Division, Kennecott Copper Corp., at Hurley, N. M. has joined the Magma Copper Co., where he is engaged in the development of the San Manuel copper mine in Arizona.

Louis P. Larsen, president of the Pend Oreille Mines & Metals Co., Metaline Falls, Wash., has anounced that **W. L. Zeigler**, for many years superintendent of mills and millwright for the Hecla Mining Co. has been named manager of the company's mining operations in Washington and British Columbia.

Dr. Angel Riveras de la Portilla, of Madrid, Spain, president of Riveras Soc. Ltda. and a chain of subsidiaries, has been spending a month and a half in the United States. His various companies own and operate a large number of mines including fluorspar, barite, iron oxides and other minerals in Spain. Dr. Riveras is arranging for the shipment of minerals to the States and for the purchase of machinery, equipment and goods. His New York headquarters is with Arnold H. Miller, 120 Broadway.

Frederick D. Woleben, safety analyst in the industrial relations department of the Oliver Iron Mining Co. at Duluth, has been made safety supervisor of the Eastern district operations to succeed **Robert F. Wilson** at Virginia, Minn.

L. A. Meyer is in Honshu, Japan, to study possibilities for changing the Texas Gulf Sulphur Co.'s operations to open cut mining. Mr. Meyer was formerly superintendent of the Kennecott Copper Corp. open pit mine at Ruth, Nev.

Evan Just, editor of E&MJ, has been appointed director of the Strategic Materials Division of Economic Cooperation Administration. This is the portion of ECA to be devoted to obtaining "materials in which the United States is deficient or potentially deficient." He will be on leave of absence from E&MJ. During the interim, **Robert H. Ramsey** will be acting chief editor.

C. D. Stevenson, mine manager, and **Dr. F. C. Buckland**, consulting engineer, have resigned from the Cariboo Gold Quartz Mining Co. **G. A. Gordon**, formerly assistant mine manager, is in charge of the property as acting mine manager. Mr. Gordon has had

wide experience as an operator in the employ of Hollinger Consolidated Gold Mines and Coniaurum Mines.

Dr. A. C. Skerl, formerly consulting geologist of the Cariboo company, has joined the British Columbia exploration department of Noranda Mines.

W. Church Holmes has resigned as president of the Sintering Machinery Corp. and has gone to Seattle, Wash., where for the time being he is engaged in consulting work. His address there is 3407 Magnolia Blvd.

Clinton H. Crane, who was president and chairman of the board of the Lead Industries Association since its inception nearly twenty years ago, retired on May 21 at the annual meeting of the association at the Waldorf-Astoria, New York City. **Felix Edgar Wormser**, vice president of the St. Joseph Lead Co., and until last year secretary and treasurer of the association, has succeeded him as president.

G. Chesterfield Evans, formerly metallurgist for the Oriental Consolidated Mining Co., Korea, and the metallurgical staff of Marsman and Co., Manila, has left Sydney, Australia, to join the Staff of the Takuapa Valley Tin Dredging Co., Takuapa, West Siam (via Bangkok).

Jose V. Monfort is now mill shift boss of the Benguet Consolidated Co.'s new 4,000-ton cyanide plant in the Philippines. He was previously with the Eagle-Picher Mining and Smelting Co., where he had the same position.

R. S. Dunn has been named to succeed the late **Charles N. Bell, Sr.**, as general manager of King Lease, Inc., Ouray, Colo.

Leonard V. Osborn is now assistant superintendent of White's Uvalde Mines, Blewett, Tex. He was formerly with the Climax Molybdenum Co., Climax, Colo.

C. E. Gordon Brown, geologist, has resigned from the staff of Vananda Mines (1948) to join the exploration department of Leitch Gold Mines. He is making his headquarters at Cranbrook, B. C.

Roland I. Erickson, mining engineer, who recently returned from the tin mines of Bolivia, is now with the Cleveland Cliffs Iron Co. on the western Mesabi range.

Sherman Hinckley, general manager of Consolidated Eureka Mines Co., Eureka, Nev., has been made general manager of the Rico Argentine Mining Co., properties at Rico, Colo.

A. W. Stollery, Jr., has been named assistant mine manager of the Polaris-Taku Mining Co. at Tulsequah, B. C.

J. A. Williams, Alaska Juneau Mining Co.'s general manager, is again in Juneau, where he is supervising the maintenance of the company's mine.

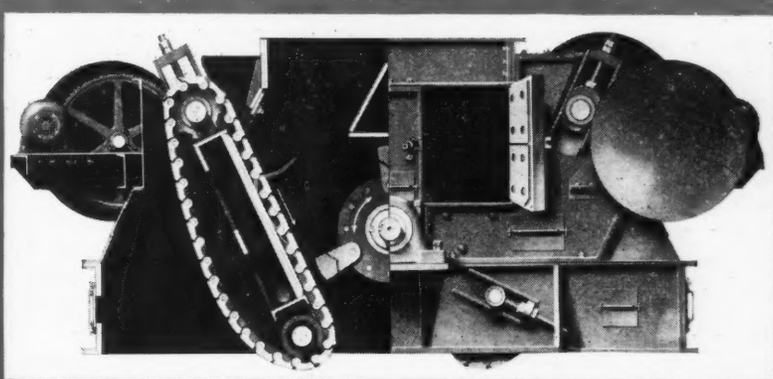
Dr. Warren S. Peterson of the Permanente Metals Corp. has been chosen

Announcing a

REVERSIBLE

Traveling Breaker Plate

SWING HAMMER CRUSHER



● NOW . . . Swing Hammer crushers with traveling breaker plate—designed for handling wet, sticky clay, ores, limestone, etc. No building up at any point—no plugging of machine.

42″ x 50″ Reversible size Weight—approx. 30 tons
Maximum feed—40″ square x 18″ thick

Both traveling breaker plates are adjustable—are driven individually by gear head motors. Possible to run one size of product on one side of machine—to obtain another size by simply reversing the rotor.

This same crusher built in 36″ x 24″ size but non-reversible. The two machines make it possible to use large one as primary unit, the smaller for secondary crushing or smaller capacities. Write for more detailed information.

CONVEYORS • BUCKET ELEVATORS
FEEDERS • CAR PULLERS • CRUSHERS
CHAINS AND TRANSMISSION MACHINERY

JEFFREY ...ESTABLISHED 1877

THE JEFFREY MANUFACTURING COMPANY
974-99 North Fourth Street, Columbus 16, Ohio

Baltimore 1	Chicago 1	Detroit 13	Jacksonville	Pittsburgh 22
Birmingham 3	Cincinnati 2	Harlan	Milwaukee 2	St. Louis 3
Boston 16	Cleveland 13	Houston 5	New York 7	Scranton 3
Buffalo 2	Denver 2	Huntington 19	Philadelphia 3	Salt Lake City 1

to direct the physical metallurgy laboratory of the new Kaiser Aluminum Research Department at the company's Trentwood rolling mill near Spokane, Wash.

J. R. Bryce has left the Cerro dePasco Copper Corp. of Peru to work as mill superintendent with Patino Mines and Enterprises Consolidated of Bolivia. His mailing address is Compania Minera y Agricola Oploca de Bolivia, Chocaya, Bolivia.

T. M. Bethune has been made mine superintendent for the Island Mountain Mines Co., Wells, B. C. He was previously associated with Cochenour-Willans Gold Mines.

Wayne R. Bolitho, mining engineer, has joined the engineering department of the Inter-State Iron Co.'s Hill-Annex mine.

C. G. Bruce, Jr., is mine foreman of the Howe Sound Exploration Co.'s Snow Lake division at Snow Lake, Manitoba.

Floyd G. Anderson, formerly with the U.S. Bureau of Mines at Duluth, has been transferred to the health branch of the bureau at Pittsburgh, Pa.

H. M. Lavender ('16) vice president and general manager of the Phelps Dodge Corp., Douglas, Ariz., received one of the distinguished achievement awards presented to graduates of the Colorado School of Mines, Golden, Colo.

R. B. Tempest, Jr., is now on the engineering staff of Chino Mines, Santa Rita, N. M. He was formerly associated with the Kennecott Copper Corp. at Ruth, Nev.

Art Stromberg, Bridge River mine operator, is now mine manager of Dentonia Mines, Greenwood, B. C.

Thomas L. Wells is now mining engineer and associate in North American Mines, Inc., 209 Washington St., Boston, Mass. He was formerly an associate editor of E&MJ, and prior to service in the Pacific with the Marines during the war, was associate editor with the Explosive Engineer.

OBITUARIES

Howard Norsworthy, 65, died May 20 of a heart attack. A graduate (1904) of the School of Mines, Columbia University, Mr. Norsworthy specialized in gold mining, and worked with companies in Africa, South America, Alaska and Canada. He became associated with the late Irving W. Bonbright in 1935 as supervisor of the Bonbright mining interests in Nicaragua, and continued to work for the estate after Mr. Bonbright's death in 1941.

F. A. Unger died in Johannesburg, South Africa, on May 10. He was deputy-chairman of the Anglo American Corporation of South Africa and contributed greatly to its technical direction. He was a member of the boards of Brakpan Mines, Daggafontein Mines, New Era Consolidated, South Africa Land and Exploration Co., and Springs Mines. Mr. Unger also was on the executive committee of the Transvaal Chamber of Mines.

Harold S. Gay, mining geologist, died Apr. 24 in Queretaro, Mexico. During the early part of his career in Mexico, he was mining engineer for the American Smelting & Refining Co. Later Mr. Gay worked as a geologist for many years with the Compania Minera Real del Monte at Pachuca, after which he devoted his time to his own mining interests and made his headquarters at Culiacan in Sinaloa.

Maurice J. Farrell, superintendent of the Orford department, International Nickel Co.'s refinery at Copper Cliff, Ontario, died Apr. 25. He was 55. Mr. Farrell first worked for the Canada Copper Co. in 1913. In 1921 he was employed by General Motors of Canada, and later became associated with International Nickel as foreman at Port Colborne. He joined the smelter staff at Copper Cliff in 1931, where he lived until his death.

W. Spencer Hutchinson, 78, Professor Emeritus of Mining and Metallurgical Engineering at Massachusetts Institute of Technology, died May 25. He retired in 1939 after 17 years on the faculty. Professor Hutchinson was graduated from MIT in 1892 and gained experience in Western mining fields, after which he opened a mining engineering office in Boston. He was a former director of the AIME and a member of the Mining and Metallurgical Society of America.

Leo J. Hoban, secretary-treasurer of the Hecla Mining Co., died suddenly June 16. He was 58. An expert accountant specializing in taxes affecting the mining industry, Mr. Hoban appeared before several tax committees and helped eliminate measures harmful to the industry.

Byron G. Best, supervisor of safety for the Oliver Iron Mining Co., died May 8. He was 56. Mr. Best first worked with the company on the Gogebic iron range in 1909, where he served as mining engineer until he came to Duluth in 1924 as supervisor of safety. He was a president of the Gogebic Range Engineer's Club, a member of the AIME, a member of the Lake Superior Mining Section of the National Safety Council, served on the council's executive committee from 1942-45, and was general chairman for 1946-47.

Leonard C. David, 67, assistant manager of Pickands, Mather & Co., Duluth, died May 7. He joined the company in August, 1918, at Gilbert, Minn., as assistant general superintendent of the eastern Mesabi district, and in November of that year was made general superintendent. He was general superintendent of the Hibbing district from 1931 until he went to Duluth. Mr. David had worked at Michigan mines and in the Ural Mountains of Russia before becoming associated with the Pickands, Mather Company.

CORRECTION:

A notice in the May issue of E&MJ under the title "An Appreciation of Dr. H. Foster Bain" incorrectly stated that Dr. Bain was editor of the Mining Magazine of the Bureau of Mines from 1921-25. Dr. Bain was editor of the Mining Magazine from May, 1915, to Sept., 1916, when he joined Mr. H. C. Hoover of the Commission for the Relief of Belgium.

An Appreciation of Lewis D. Hopfield

Lew Hopfield, as he was known to his associates and friends, was an outstanding figure in the gold dredging industry. He was born at New Lisbon, Wis., in 1869. He missed his 79th birthday by about 8 days. When only 8 or 9 years of age he went to Oregon where he later obtained experience as a bridge builder on a railroad at McMinnville, Ore. In association with the late T. C. Parker, a brother-in-law, Hopfield next went into the shipbuilding industry. Subsequently both men went to California (1904) and engaged in building wooden hulls for gold dredges. Hopfield's ability was soon recognized and he was placed in charge of installing the mechanical equipment upon the wooden hulls. His first job, Feather River Dredge No. 7 (Natomas No. 1), was completed and began operation on Dec. 22, 1906. Unusual resourcefulness in construction and handling labor gave him leadership in the highly specialized field of gold dredge building. About this time rapid progress was being made in California in exploiting gold dredging areas and many dredges were constructed.

Yuba Consolidated Goldfields engaged Hopfield to superintend the operation of its ten gold dredges at Hammonton on the Yuba River. He became known for his encouragement and helpfulness to his dredgemasters, a policy which assisted in obtaining low costs for dredge operation and maintenance. In 1910 he was advanced to general superintendent of dredge construction for the Yuba Manufacturing Co., an affiliate of Yuba Consolidated. At that time Yuba Manufacturing was building gold dredges in several Western states.

Hopfield obtained his knowledge and ability and developed managerial and engineering skill on the job without benefit of college training. At one time he received private instruction in mechanical drafting. His knowledge of gold dredging embraced such scope that his advice was sought by dredge operators all over the world. Many improvements in modern dredges are the result of Hopfield's diligence in

ferreting out the faults in existing designs.

In 1912, he associated himself with the Natomas Co. and became division manager. For some 21 years he directed the operation of a dozen or more dredges in California.

Hopfield retired from active management in 1933 but maintained his interest in gold dredging. He served as consultant for the designing of the first special gold dredges built for the Bulolo field in New Guinea. He served on the board of directors of the Snelling Gold Dredging Co. and the Thurman Gold Dredging Co. His activities in the consulting field continued until his death on Apr. 16, 1948.

The combination of resourcefulness, mechanical and managerial competence together with outstanding integrity and wisdom gained the wholehearted esteem and respect of his associates and the mining fraternity.

Chas. H. Thurman
Chas. M. Romanowitz

LETTERS

Why Not Use Our Gold?

The Editor:

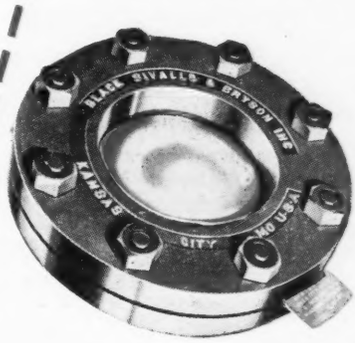
In your issue for March the New York Chamber of Commerce is quoted as recommending that it would be premature to return to a gold standard as a basis for currency until conditions in the world's monetary systems are less confused than at present.

I suggest that it is the very lack of a gold standard which is largely responsible for the present confusion and that such confusion can be remedied only by a return to the gold standard. In support of this opinion I refer to the book entitled "Will Dollars Save the World?" by Henry Hazlitt, a recognized financial authority, who contends that all civilized nations should promptly adopt a real gold basis for currency in place of a merely technical one.

I do not infer that the currency situation is responsible for many of the domestic and international problems with which we are confronted or that the adoption of any different policy can serve as a cure-all. However, I believe that the prompt revaluation of gold by the leading producers and holders of that metal (with or without the concurrence of Russia) followed by the actual issue and use of gold coins and gold certificates would have a very helpful effect on the economic maladjustment of the civilized world.

Except for Switzerland, which actually mints its gold into coins, practically all foreign nations seem to be short on "dollar exchange," even those which, like South Africa and Canada, are large gold producers. They are likely to remain so while there is no other common basis on which they can trade with us or among themselves.

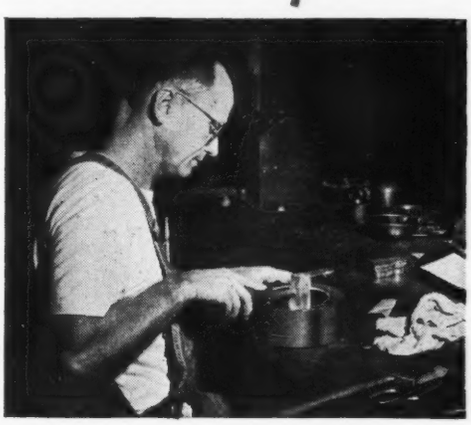
Individually Processed



Each Black, Sivalls & Bryson SAFETY HEAD rupture disc is processed individually, to insure operation according to specifications. B S & B craftsmen, skilled in working the many metals used as rupture discs, complete the job that precision machines begin.

Such care in manufacture pays dividends to you in added security. SAFETY HEADS offer positive relief from over-pressure. No other device offers such complete protection with such economy. With amazing versatility, they are made to burst at pre-determined pressures from 5 to 25,000 psi.

Write today for complete information. Address Special Products Division, Black, Sivalls & Bryson, Inc., Power and Light Building, Kansas City 6, Missouri.



● Smoothing the edge of a SAFETY HEAD pressure disc . . . one of the many hand operations in the manu.acture of these dependable pressure fuses.

EFFICIENCY RELIABILITY

FOREIGN INQUIRIES INVITED Cable Address: BLACK, KANSAS CITY, U.S.A.

BLACK, SIVALLS & BRYSON, INC.

KANSAS CITY, MO. OKLAHOMA CITY, OKLA.

Even the value of our dollar—in terms of labor and commodities — has been steadily declining for the past twelve years so that it is now not much more than 50% of what it was in 1936.

In a very thoughtful and logical article published in the January, 1948, issue of Mining and Metallurgy, Robert H. Bedford calculated that whereas in 1914—when gold and currency were freely interchangeable—the value of gold in terms of labor, etc., was really $20.67 per ounce, in 1945 a similar computation showed one ounce of gold to be worth $65.73. If his formula had been applied in 1947, the value would certainly have exceeded $75.00. Mr. Bedford also points out the fallacy of concluding that an increase in the price of gold (if it should once again be coined to *replace* some of our silver and paper money) would be a factor in increasing the present or future trend toward inflation and it is my belief that a new value of $62.20 per ounce ($2.00 per gram) would best meet the situation.

Doubtless there would be some hoarding of gold, but that procedure would be deflationary, just what the economists have been advocating for the last five years. If people should save some of their money in gold pieces rather than Government bonds, we should at least be saving the Government the interest on the bonds. The resulting deflation of our domestic currency is much to be desired.

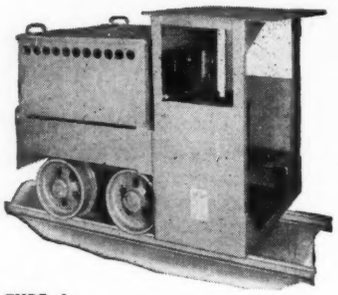
Of course, practically all nations which wish to engage in world trade would have to return to the gold standard but not necessarily to gold coins. It is probable that neither the present world stock of gold available for currency nor the expected annual production would be sufficient to keep up with the total demand. Moreover, gold coins, having of necessity a high value, are unsuitable for the majority of the world's inhabitants.

As it now appears that we must still loan or give away some eighteen billion dollars under the terms of the Marshall Plan, why not let some of this aid take the form of gold bars from our useless stock, which would be just as helpful as dollar credit and—with gold nearly doubled in value—much less of a drain on the pocketbook of the American taxpayer.

Present political conditions are so critical that it seems to be most important to take any step which might lessen the economic troubles which cause so much political tension. To quote Winston Churchill, "A stable and easily exchangeable coinage is one of the most essential prerequisites to future peace." The time has come for us to make a supreme effort to put our accumulated gold and silver to some really useful purpose.

GEORGE M. COLVOCORESSES
Mining and Metallurgical Engineer
Phoenix, Arizona
April 1, 1948

ATLAS



METAL MINING LOCOMOTIVES
GUARANTEE
DAY AFTER DAY
OPERATION

TYPE J
1½ TON TRAMMER
WITH CAB

Assures continuous operation with a minimum of maintenance. Battery operated. Flat top battery box expedites battery exchange. "Dead Man" control. Standard safety equipment.

ATLAS ENGINEERING SERVICE
IS ALWAYS AT YOUR SERVICE

Canadian Representatives
Mine Equipment Co.
Kirkland Lake, Ont.

International Agents &
Machinery Co. Ltd.
Vancouver, B. C.

South Africa
BMS Limited Industrial Stand
P. O. Box 50, Cleveland
Transvaal, South Africa

THE ATLAS CAR & MFG. CO.
ENGINEERS MANUFACTURERS

The LIGHTEST MODEL X-RAY
MOST ECONOMICAL
SURFACE DRILL

Designed especially for preliminary work in undeveloped areas where transportation and fuel consumption are factors. Total weight only 195 lbs. Drilling capacity 200 feet, three-quarter inch core.
200 lbs.
WE LOOK INTO THE EARTH

BOYLES BROS. DRILLING CO. LTD.
DIAMOND DRILLING CONTRACTORS AND MANUFACTURERS
VANCOUVER B.C. EDMONTON, ALTA. PORT ARTHUR, ONT. KIRKLAND LAKE, ONT. YELLOWKNIFE, N.W.T.

NEW BOOKS

INTRODUCTION TO MINE SURVEYING. Second Printing. By William Wesley Staley, Assistant Professor of Mining, University of Idaho. Published by Stanford University Press, Stanford, Calif. Pp. 269. Price, $3.50.

First published in 1939, it quickly sold out, and has now been brought out in a second printing. The book is written primarily for students and young mining engineers to familiarize them with the latest in surveying techniques, procedures and instruments. The material was obtained from numerous replies to a lengthy questionnaire sent out by the author to prominent mining companies, and from his own experiences as a teacher and practicing engineer. The result is a very practical little handbook.

The reader is assumed to have a basic knowledge of surveying, therefore a long treatise on elementary principles is omitted. Only information of immediate value is included. Common sources of error are pointed out and many techniques, such as "shooting" the sun in determining the true meridian, usually considered as difficult by the average mining engineer are shown to be simple and easy to perform. Methods of notekeeping are emphasized.

Short chapters on bore-hole and coal mine surveying are included. A complete bibliography is given at the end of each chapter.

TECHNICAL DESCRIPTIVE GEOMETRY. By B. Leighton Wellman, Head of Division of Engineering Drawing, Worcester Polytechnic Institute. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N. Y. Pp. 508. Price, $4.

Professor Leighton explodes a common concept that descriptive geometry cannot be understood unless the student is gifted with certain abilities to imagine or visualize. He places the emphasis on logic—not imagination—and takes nothing for granted regarding a student's elementary or preliminary training. The first chapter starts with a clear explanation of "principal views" of an object. A series of 17 simple rules governing perpendicularity of lines of sight, alignment of points, contiguous areas, etc. are printed in bold-face type, and knit the sequence of chapters of this text into a logical training course which carries the student from simple concepts of points and lines through to the intersection and development of complex surfaces.

Views are classified simply as "adjacent" or "related," without reference to imaginary planes and projections. Enough problems are given to avoid repetition of classroom assignments for four or five years. Numerical answers are given at the end of every problem that can be so answered. This feature might be helpful to the engineer who wants to review the subject, or to those lacking abundant imagination who may have slipped through this subject in college without fully knowing what it was all about.

FUNDAMENTALS OF SOIL MECHANICS. By Donald W. Taylor, Associate Professor of Soil Mechanics, Massachusetts Institute of Technology. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Pp. 700. Price, $6.

A scientific approach to the subject of soil mechanics is stressed in this text. Practical applications of theory are then treated in discussions of soil tests, seepage in soils, strength and deformation characteristics of soils, stability of slopes, bearing capacities and others. A list of 174 references concludes this valuable text on a comparatively recent science.

GEOLOGICAL STRUCTURE OF THE ZINC-LEAD DISTRICT OF NORTHWESTERN ILLINOIS. By H. B. Willman and R. R. Reynolds. Illinois State Geological Survey, Report of Investigations No. 124. Urbana, Ill., 1947. Pp. 15, with maps and sections. Free.

An up-to-date description, with appropriate maps and sections, of the old Galena area, which has recently been enjoying a revival (E&MJ, Jan., p. 63). The old theory of ore accumulation being tied to shrinkage of the oil rock is discarded in favor of one designating favorable areas as due to structural deformation resulting from regional diastrophism.

GENERAL MINING CHART OF THE REPUBLIC OF MEXICO. Published by the Ministry of National Economy. Order from Comision de Fomento Minero, San Juan de Letran, Mexico City, Mex. Price: A. In paper (4 sheets 27 x 38 in.), $4 U. S. cy.; B. Pasted on cloth (51 x 74 in.), $8 U. S. cy.; C. Pasted on cloth, folded letter size, $8 U. S. cy.; D. Pasted on cloth, folded letter size, bound in cloth, $9 U. S. cy.

This excellent map printed in six colors shows the locations of producing mines and districts and indicates production of various minerals. The chart has been made up at a scale of 1:1,650,000 and was printed by the National Geographic Direction of the Mexican Government. For those interested in Mexico's mining industry, this chart will prove a valuable reference to students and mining men.

COPPER AS AN ALLOYING ELEMENT IN STEEL AND CAST IRON. By Dr. C. H. Lorig and R. H. Adams, assistant director, and research metallurgist, respectively, of Battelle Memorial Institute. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N. Y. Pp. 213. Price, $3.

A valuable reference handbook for the metallurgist, design engineer and others interested in technical information on copper as an alloying agent in iron and steel. Practical data on the properties, characteristics and applications of cast copper steels, wrought copper steels, copper cast iron and copper malleable iron are included.

ALUMINUM AND ITS APPLICATIONS. By Hiram Brown, Chief Metallurgist, Solar Aircraft Co., and Associates. Published by Pitman Publishing Corporation, New York. Pp. 338. Price, $5.75.

Practical applications of aluminum and its alloys are discussed in individual chapters written by authorities on aircraft assemblies, railroads, automotive assemblies, electrical appliances and other fields. Major alloys, fabricating methods, finishing, testing, and heat-treating are fully covered and illustrated. The text concludes with 28 tables of physical and chemical properties of various aluminum products and alloys.

UNDERGROUND METAL-MINE FIRES FROM CUTTING AND WELDING. Information Circular 7453. May be obtained by writing to Publications Section, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh, Pa.

Proper precautions to prevent fires from welding in underground metal mines are recommended in this bulletin which describes 19 typical metal-mine fires in the United States and Canada. Specific precautions for combatting fires of this nature include thorough wetting of the working place before and after welding and cutting, the use of fire-resistant shields, provision of adequate fire protection near the area, frequent examination of the working area for at least eight hours after the welding has been completed, and proper training of personnel in this phase of the work. The bulletin was prepared by Allen D. Look, of the Safety Branch.

REGIONAL NEWS

PLANT FOR FLOATING FELDSPAR, when under construction by Feldspar Flotation Corp. at Spruce Pine, N. C. Beyond to the right is a plant of English Mica Co.

IRON COUNTRY

Activity renewed in various mines in Michigan and Minnesota—Mine and mineral valuations increased in Iron County, Michigan

★ Skubic Brothers, contractors of Virginia, Minn., will strip the Ajax mine between Biwabik and Aurora, Minn. They expect to ship ore from the property during this season.

★ The Zimmerman mine in Gaastra village, Mich., is again being worked, this time by Pickands, Mather & Co. It was last operated by the M. A. Hanna Co. and has been closed since February 19, 1945.

The Zimmerman adjoins P.M. & Co.'s Buck mine, while that company's Bengal mine adjoins the M. A. Hanna Company's Tully mine. An exchange of the Zimmerman for the Bengal was advantageous to both companies and resulted in the reopening of the Zimmerman on May 1 with 70 men employed at the property.

★ Franklin G. Pardee, Michigan State mine appraiser and geologist, has recommended an increase of $1,787,000, about 13%, in mine and mineral valuation for Iron County, Mich., for 1948. Greatest increases are on mines of Iron River township.

★ Working 5 days per week and 3 shifts a day, the Calumet & Hecla Consolidated Copper Co. drifted 426 ft. during the month of March on the 24th level of the Seneca copper mine at Ahmeek, Mich.

★ The Schley, Pettit and Hobart mines near Gilbert, Minn., idle for more than 20 years, have been leased to the Inter-State Iron Co. which plans to begin pumping from the Hobart shaft.

★ The Jackson County Iron Co., subsidiary of the Inland Steel Co., has considered opening the Larson property, 4 miles west of Florence, Wis. Drilling last winter showed a small tonnage of iron ore and a contract was let to A. Lindberg & Sons to strip and mine the ore.

★ The new conveyor belt at the Hawkins mine, Nashwauk, of the Cleveland Cliffs Iron Co., has been put into operation. The belt, 6 ply, 30 in. wide, is in 2 stages with a total overall length of 1,085 ft. and a vertical lift of 255 ft. It has a rated capacity of 700 tons per hour.

★ The Trout Lake washing plant of the Oliver Iron Mining Co. is busy with the production from the Arcturus, Gross-Marble, Morrison and Walker mines in addition to some crude ore that is shipped to the plant from mines in the Hibbing district.

★ Shipments of iron ore from the Lake Superior area for 1948 were 19,094,454 tons to June 1, 4,491,387 tons greater than those for 1947 at the same date.

★ The iron powder plant at Aurora, Minn., which utilizes low grade iron carbonate, is at present undergoing minor modification found necessary after test runs.

★ The Inter-State Iron Co. is enlarging and adding new equipment to its testing laboratory at the Hill-Annex mine at Calumet, Minn. The company has a large tonnage of potential ores suitable for concentration in its pit, lean ore stockpiles and in the big tailings pond. Ore material samples from its west Mesabi properties will be given careful preliminary tests after which those having concentrating characteristics will be sent to the Jones & Laughlin Research Laboratory in Negaunee, Mich.

★ Butler Brothers Co. is building a large addition to its range headquarters general office at Cooley, Minn. M. A. Hanna Co. and the Cleveland Cliffs Iron Co. have completed additions to their general offices at Hibbing.

★ The E. W. Coons Co. is stripping on the north side of the Commodore mine at Virginia, Minn., as part of its 1948 operation at the Julia-Commodore.

★ A. Lindberg and Sons of Ishpeming were to begin work on the grading for a one-mile spur track from the Duluth, South Shore and Atlantic Railroad to the Champion mine at Beacon, Mich. The North Range Mining Co. is unwatering the mine but will require a few months before starting production.

★ The Mahoning Ore and Steel Co. is test drilling on its Mahoning No. 4 reserve east of the exhausted Dale pit. Presumably the company is anticipating the time when the 53-year-old Mahoning pit will no longer be able to furnish the large tonnages required.

★ Following the action of the steel companies, most of the Lake Superior iron mining companies have refused the application of the CIO union for further wage advances.

MICHIGAN

Quincy smelter to be reopened soon—Calumet & Hecla installs press to bale scrap before leaching

★ Franklin G. Pardee, deputy state geologist and appraiser of mines in Michigan, has recommended to the State Tax Commission a total valuation of $2,782,000 on mines in Houghton County as compared with $2,576,000 for 1947, and a valuation of $1,100,000 in Keweenaw County, as against $975,000 the previous year. Total mine valuations in the two counties are $3,882,000 for 1948, as compared with $3,551,000 for 1947.

According to State and Federal agencies, a total of 46,544,767 lb. of copper from current mine operations and reclamation was refined in the Michigan district last year.

★ Resumption of operations at the smelter of the Quincy Mining Co., idle

since 1932, will get underway as soon as adequate repairs have been made. A crew is preparing the smelter for the treatment of copper reclaimed at the company's sand workings in Torch Lake, near Mason. Plans call for blowing in one reverberatory furnace in the main building, which is 144x84 ft. Actual dipping of metal is not expected until late summer or early fall.

★ The Michigan Supreme Court has denied the objection of the Copper Range Co. to the State's grant of unemployment benefits to more than 700 employees thrown out of work when the company closed its Painesdale mine. The company's petition for a rehearing was rejected. The decision ends a legal wrangle pending since the company closed its Champion mine on Sept. 20, 1945, after unionized workers had twice rejected a proposal to work at reduced wages. The Supreme Court's decision reversed the Ingham County circuit court and upheld a decision by the Michigan Unemployment Commission's appeal board.

★ Another ball mill has been put in operation in the Ahmeek mill of Calumet & Hecla, making 9 such units. The new ball mill holds 50,000 lb. of steel balls when fully charged. Ball mills also are used in the company's reclamation processes. A steel ball casting machine has been added to the equipment of the Calumet & Hecla foundry, which will now turn out from 28 to 30 tons of steel balls per week, with two machines in operation.

★ Calumet & Hecla has installed a hydraulic baling press in its smelter yard to bale copper-clad steel scrap before leaching. This will save many hours in handling the scrap in and out of the leaching tanks to the railroad cars and will double the tonnage put into the leaching tanks. Certain kinds of copper scrap also can be compressed into convenient size bundles for charging into the smelter furnaces.

★ The co-operative work by the Michigan State Survey and the United States Geological Survey will be largely in northern Dickinson County, Mich., this year, though the headquarters office is expected to remain at Iron River for at least two more years.

NORTH CAROLINA

Feldspar Flotation Co. Plant at Spruce Pine in operation—Avery County ore proves practical for development

★ The Feldspar Flotation Co. has completed a new plant at Spruce Pine, N. C., and begun preliminary operations. When all machinery arrives, the plant will go into full operation. The

BUILDING MATERIALS PRICE CLIMB 1939 • 1947

Steel Price Increases Less Than 1/3 The Average on All Building Materials Prices

Why the sky-high home building costs? The joint Congressional Committee on Housing has been seeking the answer to this question for some time.

To help the Committee find the answer, the Bureau of Labor Statistics compiled figures on the increases in prices on all building materials from August, 1939, to October, 1947.

The chart above is based on these figures. They prove again our oft repeated contention that Steel IS Cheap.

It is noteworthy that price increases on structural steel are the lowest of all building materials except cement and less than a third of the average advance on all building materials.

Or, take another steel item important in home building—nails. The increase in the across the counter price of nails adds only about $15.00 to the cost of a G. I. home as against the price 10 years ago.

Steel IS Cheap!

TRADEMARK REG.

MOLY-COP

COPPER-MOLYBDENUM-ALLOY

Grinding Balls

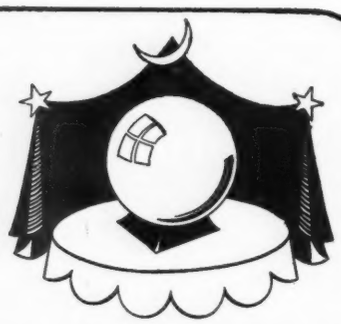
SHEFFIELD STEEL CORPORATION
HOUSTON KANSAS CITY TULSA

Carbon and Alloy Steel, Ingots, Blooms, Billets, Plates, Sheets, Merchant Bars, Steel Joists, Structural Shapes, Road Guard, Reinforcing Bars

Welded Wire Mesh, Wire Products, Wire Rods, Fence, Spring Wire, Nails, Rivets, Grinding Media, Forgings, Track Spikes, Bolt and Nut Products

SHEFFIELD STEEL

SALES OFFICES: Chicago, Ill.; St. Louis, Mo.; Des Moines, Ia.; Omaha, Nebr.; Wichita, Kans.; Denver, Colo.; Oklahoma City, Okla.; Dallas, Tex.; San Antonio, Tex.; Lubbock, Tex.; New Orleans, La.; Shreveport, La.



Predictable Castings

Most of the "guess" has been taken out of foundry work; cast iron has become predictable. Improvements are due to better control at all stages of foundry practice, and to the use of alloy irons.

Predictable Molybdenum high strength cast iron is used for engine cylinders, cylinder blocks, liners, brake drums and other castings where strength and toughness, together with good wear resistance and heat resistance, are paramount.

Molybdenum is a popular alloying element in high duty irons because of its positive and predictable improvements; the improvements far outbalance the additional cost.

Authoritative engineering data on Molybdenum cast iron and its applications are furnished by Climax Molybdenum Company.

Climax Molybdenum Company
500 Fifth Avenue - New York City

F.I.

THE NEW 505-FT. DOCK built by Permanente Metals Corp. at Baton Rouge, La., has an unloading capacity of 325 tons per hr., using a 4-yd. bucket. At the nearby plant of the Permanente company bauxite from South America containing approximately 50% Al_2O_3 is refined through the Bayer process and shipped at 99+% Al_2O_3.

North Carolina *(Continued)*

new plant will utilize the froth flotation separation method to produce feldspar, fine mica and practically iron-free quartz from a large pegmatite deposit a short distance from the plant.

Principals in the new company are H. A. Durham of Asheville, and C. C. Rogers, Sr. of Tryon, both of whom are associated with the Feldspar Milling Co.'s plant at Bowditch, Yancey County, N. C., and W. F. Deneen of Johnson City, Tenn., owner and operator of the Feldspar Production Co. of Erwin, Tenn.

★ Recent experimental work done by the U. S. Bureau of Mines in a pilot plant at Cranberry indicates that iron ore deposits in Avery County are practical for development. The plant successfully concentrated the ore to produce a low-phosphorus, high-iron product.

The Bureau reported that a magnetometer survey showed appreciable magnetic attraction over practically the entire length of the area, and the general alignment of the magnetic trends indicated a more or less continuous mineralized zone.

TENNESSEE

★ As part of a $2 million expansion program at Columbia, Monsanto Chemical Co. has begun excavation of a settling pond a half-mile long with average depth of 20 ft., to prevent phosphorus mud from flowing into the Duck River. At the lower part of the pond a 300-ft. dyke is underway which will be 45 ft. high. Plans are to build the base of the pond in such a way that seepage will be overcome by the packing of 3 to 4 ft. of clay.

The Monsanto company also announced completion of a new spur on the plant grounds which is expected to double shipping capacity, and reported progress on expansion of the office building.

ARKANSAS

White silica deposit near Rogers—Reynolds Metal will expand plant at Jones Mill

★ A large deposit of white amorphous silica has been found 6 miles east of Rogers. It is reported that tests by Midwest Research Institute of Kansas City, Mo., show the material to be 99.7% pure colloidal silica with small percentages of iron, calcium and magnesium.

A shaft is underway and shipment of crude material is expected to begin as soon as the mine can be opened and shipping arrangements completed. Plans are being discussed for a processing mill in Rogers.

★ The Reynolds Metal Co. plans to double operations at its aluminum plant at Jones Mill, it was announced recently by officials of the company in Louisville, Ky. The Arkansas Power and Light Co. has signed a 30-yr. contract to supply the power needed. The Jones Mill plant, built during the war by the Government, is operating at a capacity of about 73 million lb. a year and would be expanded to annual production of 146 million lb. or more by May 1949.

TRI-STATE

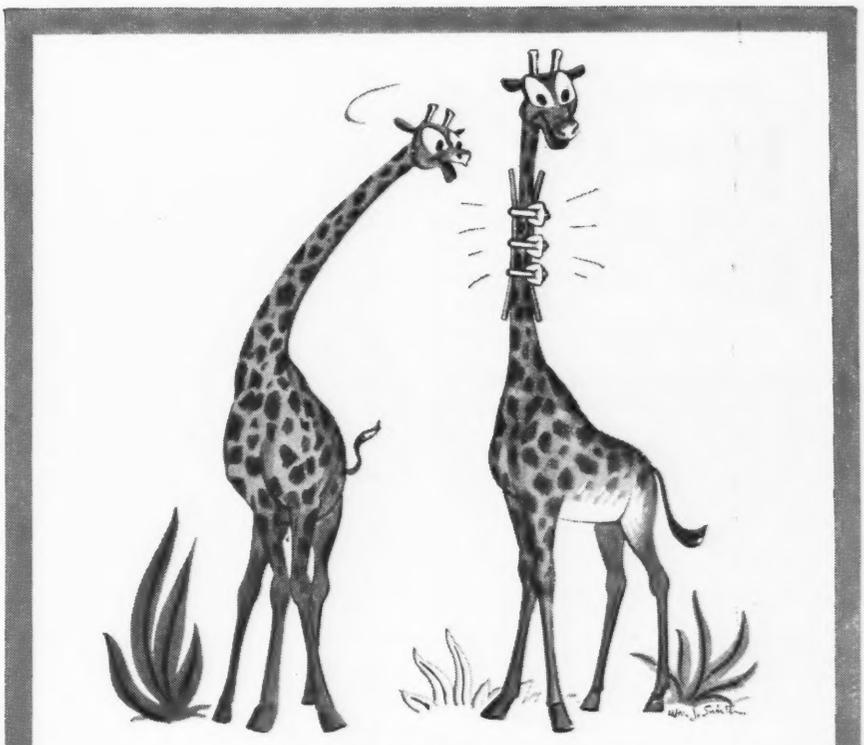
Anaconda announces exploration campaign—Eagle-Picher moves office to Miami

★ F. W. Anderson of Salt Lake City, geologist in the exploration department of Anaconda Copper Mining Co., announced early in May the inauguration of an extensive drilling and prospecting program for zinc-lead minerals in the southern section of Crawford and the northern section of Cherokee County in the southeastern part of Kansas. The company, through the Western Coal Mining Co. (Missouri Pacific), Cherokee & Pittsburg Coal Mining Co. (Santa Fe), Pittsburg & Midway Coal Co. and the Cherokee & Pittsburg Coal Co., has obtained the mineral rights—excepting coal, oil and gas—on some 50,000 acres of leased and fee land in the general area 2 miles south of Cherokee, 4 miles north of Pittsburg, and from west of Mineral east to the Missouri-Kansas State line.

Although no definite site had been selected to start drilling operations, it was planned to set a course of line holes to determine structure. It is the hope of the whole effort to find similar structural features to those of the mineralized areas of the Tri-State field. The drilling will be done into the Boone formation (Mississippian) in anticipation of finding conditions favorable to ore deposition at depths varying from 300 to 600 ft. The company started with 3 drill rigs, and the number of drilling units will be increased as the campaign expands. Anderson pointed out that the entire drilling campaign is a test effort preliminary to a more expanded program, provided favorable conditions and results are obtained.

Victor Rakowsky, prominent Joplin mining engineer, has been instrumental in interesting Anaconda. Anderson, who has been in the Tri-State on several occasions during the last several months to confer with Rakowsky and others interested in the field work, returned to Salt Lake City, but will make periodic visits to the district as the work progresses. W. L. Seymour of Salt Lake City, also a geologist for the company for several years, will be in charge of the initial drilling program, and will make his headquarters at Pittsburg, Kan.

★ With 8 large turbine pumps—handling 6,000 gallons or more of water a minute—in operation, F. W. Evans is unwatering the old Crestline mining field at the rate of about a foot a day. Evans has 2 pumps in the Crutchfield mill shaft, one in a large drill hole on the Crutchfield, 4 in the Ellis shaft and one in a large drill hole on the Ellis. The water has been lowered below an upper drift in the No. 2 shaft on the Crutchfield, and a 315-ft. porta-



So you did break your neck to get genuine Crosby Clips!

Why stick your neck out, in buying wire rope fasteners? The difference in cost between genuine CROSBY CLIPS and the cheapest fasteners you can buy is certainly not much of an item. CROSBY CLIPS are *drop-forged*—not cast. Channel grooved base, high side wings, chamfered bolt ends, are priceless features of quality. Sold by distributors everywhere, in sizes from ⅛" to 3".

Made only by AMERICAN HOIST & Derrick Co., St. Paul 1, Minnesota.

Industry uses more

CROSBY CLIPS

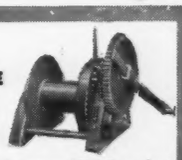
than all other drop-forged fasteners

For Armored Construction . . . specify

AMERICAN BLOCKS AND SHEAVES

● A complete line of wire rope blocks—all types, all sizes, in capacities from 1½ to 250 tons. Thick steel side plates, heavy pins and axles. Ask for American equipment when ordering.

ONE MAN LIFTS 10,000 LBS. WITH THE AMERICAN HANDIWINCH



● Gives one man the power of a crew. Weighs only 95 lbs. Handles lifting, loading and pulling jobs up to 5 tons. All steel construction. Ask your distributor.

Guard against ROT and WEAR in your FILTER CLOTHS!

Use

THORATEX
REG U S PAT OFF

IMPREGNATED FILTER FABRICS

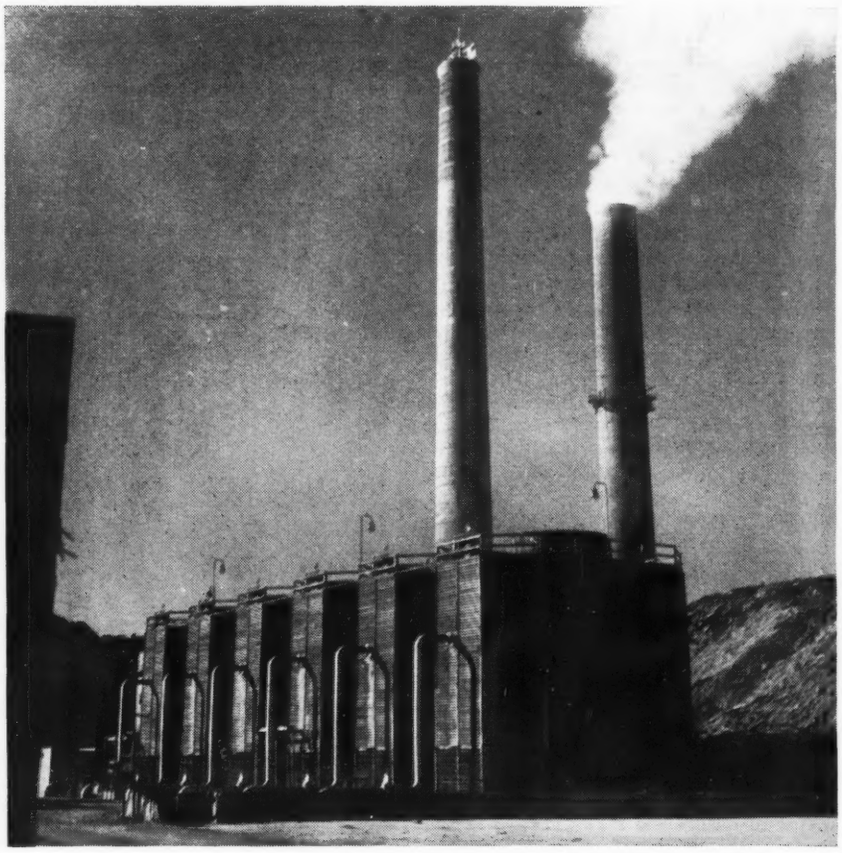
- Resists corrosive action of Alkaline and Caustic solutions.
- Mildew and rot resistant.
- Frequently outlast untreated fabrics three to one.
- Fewer washings required.
- More continuous press operation.
- Maintains filtering capacity.
- Smooth surface.
- Cakes come away easily.
- Reduces gumming.
- Less shrinkage on press.
- May be used in cold or boiling filtrations.
- May be used with hydrocarbon solvents.
- Better filtration.
- Soft, flexible—sews easily

FREE TRIAL

Send us, prepaid, a roll of your cloth for finishing. Try it under actual plant operations.

Information and samples on request.

METAKLOTH
COMPANY
LODI, NEW JERSEY



ZINC RECLAMATION PLANT of the American Smelting and Refining Co. at El Paso, Texas.

Tri-State (*Continued*)

ble diesel compressor has been acquired for mining an upper run of lead ore, Evans said.

★ Properties of the Marcia K. Mining Co. in the southeast portion of the Picher section of the field, which were acquired the first of the year by Chicago interests, now are being operated as the Nellie B. Mining Co., effective May 1, according to J. H. Buchanan of Miami, manager of the latter company. Buchanan, who was with the Atlas Powder Co. for 18 years, succeeded Claud B. Jones of Miami, former president and general manager of the Marcia K. company, as manager for the new company. Buchanan served 10 years in the export department of the Atlas firm in Mexico and was connected with the Chicago branch for several years. From 1923 to 1927 he was manager of Mexican mines of El Oro, Ltd., near Mexico City.

★ General offices of the Eagle-Picher Mining & Smelting Co., which had been located in Joplin, Mo., for many years, have been moved to the First National Bank Building at Miami, Okla. The Joplin location was vacated May 1 and the new quarters at Miami were occupied immediately.

★ O. W. Bilharz of Baxter Springs, president of Tri-State Zinc and Lead Ore Producers Association, has been appointed Mississippi Valley regional program chairman for the Metal Mining Convention and Exposition of the American Mining Congress, to be held in September in San Francisco.

NEW MEXICO

Lordsburg Mining Co. has purchased Millsight mine—Pinos Altos developing in Grant County

★ The Cochiti Mining Co. at Bland recently started its flotation mill on silver-gold ore from the old Iron King property, currently operating as a pilot-mill to test equipment and metallurgy. Concentrates are bagged and shipped by truck to the El Paso smelter. Robert O. Boykin, president of the company, is operator of the mine and mill.

★ The Pinos Altos Mining Co. has acquired several properties in the Pinos Altos and the White Signal mining districts of Grant County and is carrying on extensive exploration and development. Loren F. Read of Silver City, resident manager, has announced purchase of the Non-Metallic Corporation flotation mill in Silver City and operation is expected to get under way in the near future.

★ The Lordsburg Mining Co. has purchased under lease and bond from the Walrich Mining Co. the Millsight mine and is shipping 4 carloads of

lead ore per month to the Peru Mining Co. mill at Deming. A 100-ft. shaft has been sunk adjacent to the old workings and all present production is coming from the 50-ft. level while development continues on the 100-ft. level. The company consists of Marvin Fuller of Silver City, Gerald Fuller of Lordsburg, and Frank Weldon of Lordsburg. B. W. Venable is in charge of operations at the mine.

★ O. R. Burwell of Kingston has announced that he is starting a lead-zinc-silver operation for the Buckeye Corporation near the old Grey Eagle mine.

★ J. H. Harrison, Finley Dunagan and A. D. Harrison with lease and option on the White Eagle fluorspar mine in the Cook's Peak mining district are shipping to the General Chemical Co. mill at Deming approximately 450 tons per month of fluorspar averaging 78% CaF_2. Work is being done from the 230-ft. level where there has been approximately 550 ft. of development drifting.

COLORADO

Hermit vein of Smuggler mine shows values at low level—Nonmetallic mining near Canon City

★ Merrill E. Shoup, president of the Golden Cycle Corp., stated that the firm will probably abandon its gold mill in Colorado Springs, and the Midland Terminal Railroad. The recent strike of the railroad employees had nothing to do with the decision. "It doesn't make sense to move 2,000 lb. of rock from Cripple Creek to Colorado Springs to get half an ounce of gold," he said. The old Portland mill just east of Victor will be the site of the new mill, and greatly improved milling methods will be used at the new plant.

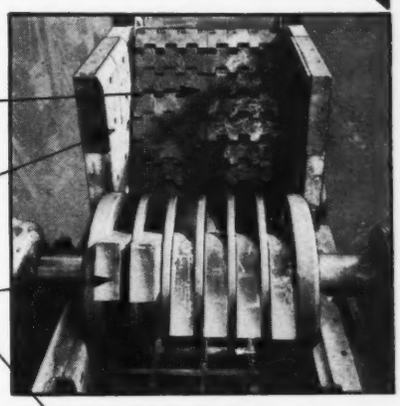
★ The U. S. District Court was scheduled to hear on June 4 a motion to dismiss indictments against 5 individuals and 6 corporations in the vanadium industry. The indictments, returned June 27, 1946, charged that monopolistic practices by the defendants virtually eliminated small operators from mining vanadium and uranium ore in Colorado. The defendants ask their dismissal because of the government's failure to prosecute.

★ A party of four gold mining engineers from the Union of South Africa are reported coming to Colorado to inspect Rocky Mountain mining operations. Representing private mining interests, the group is headed by J. D. Smuts, son of Prime Minister Jan Christian Smuts of the Union of South Africa. Members of the party include W. P. Wagstaff, A. A. von Maltitz and C. R. Banham, all of Johannesburg. A spokesman for the party said they

LOOK INSIDE

Note The Money-Saving Features Exclusive With Dixie Hammermills

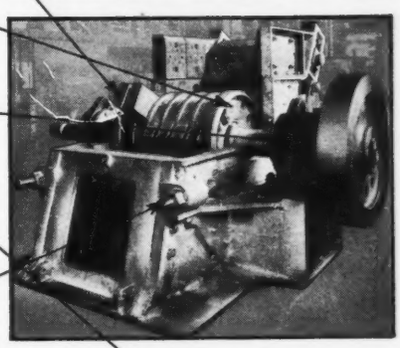
You can't judge a book by it's cover. It's the same with a Hammermill. To observe the reasons for Dixie's remarkably increased crushing efficieny we take you behind the scenes . . . give you the "inside story" of Dixie construction . . . demonstrate in the accompanying shop photos why the Dixie Hammermill is your guarantee of *greater* production at *less* cost.



Moving Breaker Plate* carries material into path of hammers.

Easily replaceable cast manganese steel wear liners.

Hammers of various weights & designs to suit the needs of material to be crushed.

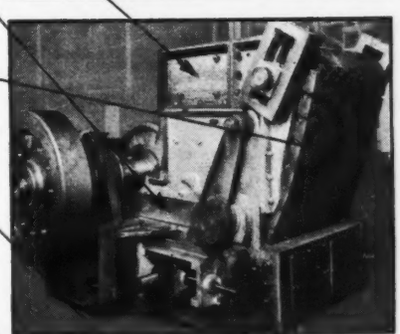


Step out holes in discs compensate for hammer wear.

Extra heavy special anti-friction bearings & housings.

Sectional construction makes every part easily accessable.

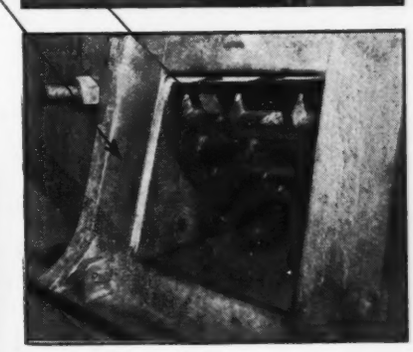
Side arm breaker plate adjusts for size of product.



Smoothly operating breaker plate. Especially designed sprockets and trunnion wheels.

Heavy cage bars; various openings for sizing materials.

All cast steel extra heavy frame for greater durability.



REMEMBER . . . there's only one Dixie. Don't be satisfied with anything less. For details request a copy of our helpful, informative bulletin, "More Efficient Crushing of Raw Materials." Write Dixie today.

DIXIE MACHINERY MANUFACTURING CO.

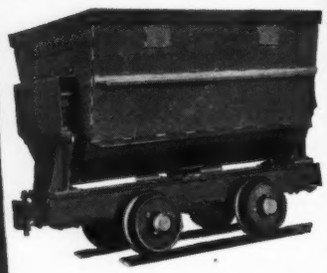
Main Office and Plant
4204 GOODFELLOW AVE.
ST. LOUIS 20, MO.

Foreign Office
104 PEARL ST.
NEW YORK, N. Y.

* Dixie's Continuously Moving Breaker Plate . . . a vastly improved crushing principle exclusive with Dixie Hammermills . . . covered by U. S. Patents granted and pending.

CARD CARS

For "Lowest Cost per Ton Mile Haul"



CARD CARS ARE ENGINEERED TO THE JOB... DESIGNED AND BUILT TO BEST MEET SPECIFIC CONDITIONS IN EACH MINE.

Ask for Catalog 40 . . . today.

C.S. Card Iron Works Co.
Denver, Colorado

Colorado *(Continued)*

are primarily interested in mechanized American and Canadian mines. There is a serious labor shortage in South Africa, making it necessary to introduce more machinery to increase production.

★ The U. S. Supreme Court ruled that the London Extension Mining Co. of Colorado and its subsidiary are not entitled to allowances for recovering minerals from a dump the company acquired with its mine from a former operator. The high tribunal refused to review a ruling on this and two other cases decided by a lower court. The court ruled that when a company is stripping a surface dump, it can take depletion allowances only to the extent that the dumpings constitute an integrated step in its mining operations.

★ A project is in process to recover the silver and lead in the low grade ore of the mine dumps in the Aspen district. A crew of men under the direction of Randall Ormsbee of the International Smelting & Refining Co., Salt Lake City, is now engaged in extensive testing of Aspen dumps.

★ The Hermit vein of the Smuggler mine has been cut in the Mill Level Tunnel at Telluride. At the point of intersection the vein carried considerable base metal values with small amounts of gold and silver. It carried more copper than was seen in the last work done on this vein approximately 1,300 ft. above. The intersection occurred in the Cutler series which is probably of Permian age. Subsequent to the first cutting of the vein it has been again intersected in a branch drift. The discovery of such a mineralization at this low level is of extreme importance to the future of mining in the San Juan area.

★ The Lead Carbonate Mines has erected a 40-ton differential lead-zinc flotation mill at the old mining camp of Gladstone. The mill is built on the hillside above the dump of the lowermost Gold King adit. All ore for the new mill is mined at the Lead Carbonate mine.

★ According to Boyd Guthrie, engineer in charge of the construction and operation of the Federal oil shale plant at Anvil Points, near Rifle, experimental work to date has produced 115,000 gallons of oil from 6,000 tons of shale. New retorts are being designed based on this work.

★ West of Canon City there is much mining activity in the non-metallic field, and there will be more in 1948. At the Harding outcrop silica and dolomite are being mined. A cinder block plant in this area is producing a fine product from volcanic residue and ordinary cinders. Ganister is mined in large quantities and before 1949 a lime processing plant will be built to the south of these operations. Already in blueprint stage is a plant to process dolomite. Feldspar is quarried at three points: the Meyers lease, the Mica Lode and the School section. Most of this feldspar is still processed at the Consolidated Feldspar Co.'s plant in Canon City.

★ Fifty San Juan County men, including miners, operators and businessmen, gathered at Silverton and formed the San Juan Mining Association. The following officers were chosen to serve for the 1948-49 period: H. P. Ehrlinger, president; Carl A. Larson, secretary-treasurer; Ross D. McCausland, vice president. C. A. Chase, John Archibald, Emile Abadie, Louis Dalla, Lincoln Shirk and W. W. Taylor, representing the various districts in the county, were elected to the executive committee.

★ At the 46th annual general meeting of Camp Bird, Ltd., it was reported the reduction in revenue received from the lessees of the Camp Bird mine at Ouray was primarily due to lower grade ore being treated, with a consequent decreased royalty yield. To assist the lessees in opening up of an unexplored section of the mine, a partial suspension of royalty payments during 1948 was agreed to. This may result in showing a loss on the account for 1948.

ARIZONA

Mineral Park mill to treat ore from New Moon—Extensive use of aerial prospecting by Whitehall Co.

★ Negotiations were scheduled for June 1 between the Inspiration Consolidated Copper Co., Miami, and the Miami Mine, Mill and Smelter Workers Union for a new wage contract. An increase of 30c. an hour, more liberal vacations and a health and welfare fund were to be discussed.

★ Arizona copper mines produced 31,325 short tons in March as compared with 29,300 the previous month and 31,250 in January. The 1947 monthly average for Arizona was 30,383 short tons. Although the daily average rate of lead output from domestic mines of the nation rose in March to the highest level since August, 1944, Arizona reported 2,660 short tons in March, compared with the average of 2,292 short tons per month last year.

★ The Whitehall Co. has developed 5 mines in the Wickenburg area since last November, all discovered by the use of airplanes. Aerial prospecting for feldspar is now a part of the company's routine.

★ The drift from the 200-ft. level of the Victoria shaft, Oatman, is now in 75 ft. Values are approximately $37 across 4 ft. Six men are employed.

★ The Triumph Mining Co., Oatman, is preparing to sink the White Chief

shaft. It is now 200 ft. deep and drifting on that level showed a shoot of ore worth further development.

★ Bob Payne and associates, Chloride, have taken over the Mineral Park mill and will treat ore from the New Moon mine. The company will also accept custom ore from the district, it was announced.

★ The Southwestern Mines, Courtland, were closed down the greater part of May and the miners unpaid for most of that period. Power was cut off by the Rural Electrification Administration. A recent survey by a Securities and Exchange engineer indicated the mine contains $750,000 worth of ore.

★ P. D. I. Honeyman, vice-president and general manager of the Inspiration Consolidated Copper Co., Miami, has been appointed to head the committee on plans for the 1948 Metal Mining Convention and Exposition of the Western Division of the American Mining Congress to be held in San Francisco the week of Sept. 20.

NEVADA

Getchell Mine has increased tonnage of cyanide mill—Deeper levels reopened at Nivloc silver

★ Getchell Mine, Inc., having solved its metallurgical problem of removing arsenical sulphide before cyanidation, is treating 200 tons per day of gold ore in its pilot test plant which, for more than a year, had been treating 100 tons in developing a lower-cost and more efficient mill process. The cyanide mill, which treated 1,000 tons per day before the war, is scheduled to operate on a 1,500-ton basis soon. New ore-moving equipment, from the main North shaft to the mill, has been installed, including large conveyor belts and crushing units that will enable delivery of 1,500 tons to the steel coarse-ore bins within 6 hours.

On the present lower level of the North shaft the Getchell orebody has been crosscut 600 ft. below the outcrop for a width of 60 ft. Tunnels driven from the South pit, over 4,000 ft. from the North shaft, also have revealed great widths of mill ore and the tonnage now blocked was said to insure a capacity mill supply for a long period. Sinking will continue with the purpose of cutting the Getchell vein on its east dip, at around 1,200 ft. Roy A. Hardy of Reno is directing engineer; George Wingfield, president.

★ Deeper levels of the Nivloc silver mine in Esmeralda County are to be reopened by Southern California men, heads of the Eureka Mining Co., who have obtained a long-term lease on the eastern part of the property adjoining claims owned by the Eureka company. In this part of the Nivloc

OUR Customer WROTE This AD

Letters like this confirm our belief that a well designed magnet, carefully built, resuits in satisfied and enthusiastic users and —is its own best salesman. See picture below.

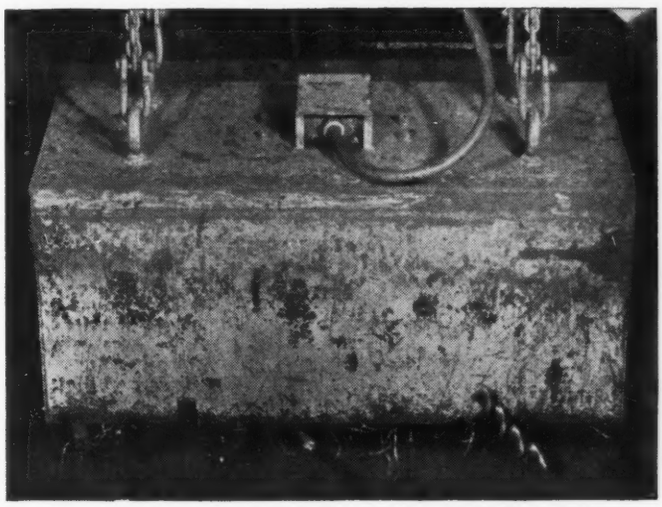
SAVE TIME — DO BETTER JOB*

"We have used a considerable number of magnets in the past 15 years, and at present have 5 of your lifting magnets in our service. These are performing excellent work, and every one of them is doing a better job of lifting than those which we had formerly used.

"As you know, these lifting magnets are used throughout our cleaning room and foundry wherever castings have to be moved and are great time savers as there is no need for chains or chainmen. A crane operator can perform the whole job of moving castings from place to place throughout the plant."

*Name on application.

Stearns Magnets are designed in all practicable sizes and shapes to suit your application whether it be for lifting or suspended separation purposes. If you want a dependable, powerful magnet, consult Stearns Magnetic, Milwaukee.



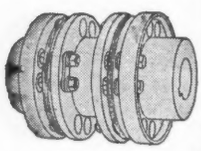
Stearns

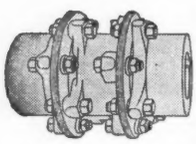
SEPARATORS • ROLLS • DRUMS
CLUTCHES • BRAKES • SPECIAL MAGNETS

MAGNETIC MFG. CO.
624 S. 28th St., Milwaukee 4, Wis.

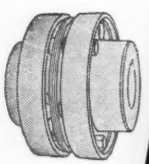
THOMAS
Flexible ALL METAL
COUPLINGS

Engineered to stand up on the toughest jobs, Thomas Flexible Couplings do not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.



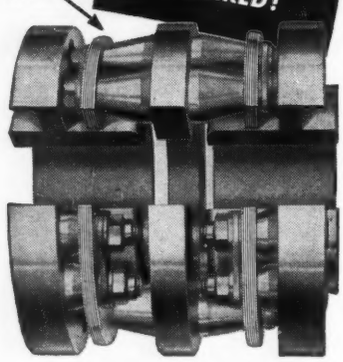


The standard line of Thomas Couplings meets practically all requirements. But if unusual conditions exist we are equipped to engineer and build special couplings.



BACKLASH
FRICTION
WEAR and
CROSS-PULL
are eliminated
NO LUBRICATION
REQUIRED!

PATENTED
FLEXIBLE
DISCS



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

Write for New Engineering Catalog

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Nevada *(Continued)*

property, reports indicate, ore of uniformly high grade is exposed on the 700 and 800-ft. levels. Some ore has been shipped to the Kennecott smelter at McGill and mill construction is in prospect.

★ Four leases on old mines at Goodsprings, Clark County, have been producing high-grade lead ore for shipment to smelters in Utah. Jay A. Carpenter, director of the Nevada State Bureau of Mines, said after a recent visit to the district that most of the product had a lead content of over 30%. His survey revealed a large tonnage of 10 to 20% oxidized lead and lead-zinc ore. During early war years the State Bureau conducted highly successful tests in treatment of such ore with caustic soda, then a waste product at the nearby basic magnesium plant at Henderson. The U. S. Bureau of Mines later developed the process with good results at Boulder City. Steps are being taken to provide a similar plant at Goodsprings.

★ Early reopening for treatment of custom ore of the Desert Gold 50-ton mill at Stateline, Esmeralda County, is expected. A crew under direction of Clyde Barcus of Goldpoint was reportedly engaged in repairing the pipeline to the plant from Mt. Magruder near Lida, source of Goldfield's water supply during the camp's productive years. The mill is 6 miles from Goldpoint, formerly Hornsilver, where work has been in progress and considerable good mill ore is available on mine levels as deep as 900 ft.

★ Veins in the Searchlight district, Clark County, that were highly productive in early years of that camp, are being developed and drilled by the Metallic Exploration Co., backed by New York, Texas and Nevada interests. Work is centered on the Duplex vein system, a gold and silver producer. An old shaft has been retimbered, a station cut at the 100-ft. level for crosscutting the 3 main parallel veins, and sinking will continue to the 300 level.

★ The 40-ton Kinkead cyanide mill in Mineral County has been reconditioned to treat gold ore from producers in the Pamlico district, some 7 miles south of the plant, owned by J. J. Hollaway and associates, who have shipped high-grade ore to smelters. Power is provided by the Mineral County power system.

★ Toiyabe Mining Co. is expected to begin work soon on a large gold-bearing outcrop on property situated 100 miles north of Tonopah. Madison Locke, highway contractor, left for New York Canyon recently to complete a road to the site, which has been purchased on bond and lease from Louis and Phil Meyer and W. H. Thomas. A compressor and other equipment is ready to move in as soon as the road is completed. Phil and Louis Meyer are developing a placer acreage in another part of New York Canyon.

★ Operations in Copper Canyon mine, Lander County, shut down since late in March by a heavy flow of water from an ore fissure, have been resumed on the new 700-ft. level. Three shifts are at work. Approximately 20 million gallons of water contained in the horizons between the new 700 and the old main at 500 ft. were pumped from the level.

★ Sampling of gold and silver mine dumps of the Consolidated Virginia Mining Co. at Virginia City is proceeding. The program being carried out by Copeland-Knight got under way with the completion of the automatic sampler and the arrival of the drilling rig from the coast. The contract calls for 3,000-4,000 ft. of test drilling. Dumps will be drilled with a 2-ft. diameter bucket. Drilling equipment is mounted on a 10-ton truck and includes a 34-ft. collapsible derrick.

UTAH

State convention of CIO resolves to clear up dissension—Locomotives damaged at Kennecott

★ "Rightists," including members and friends of the Progressive Metalworkers' Council, triumphed by substantial majorities in every contested vote at the annual state CIO convention conducted May 19-22 at Price. The show of strength was significant in that International Union of Mine, Mill & Smelter Workers has the largest membership of any union affiliated with the state CIO.

George J. Wilde, Utah-Nevada representative for PMC, was seated as a delegate from Tintic local which has seceded from MMSW, but which has not yet affiliated with PMC. Prior to the vote on seating of Tintic delegates, another spokesman made it plain that if CIO did not want the Tintic local, it would go elsewhere. Arthur Mullett, also a Utah-Nevada representative for PMC, was seated as a delegate of Wax Workers' local, Soldier Summit.

Resolutions were adopted condemning the third party, opposing the Mundt-Nixon bill and appealing to the national CIO to use its authority to "clean up all situations causing dissension among members of international unions." A resolution on raiding of unions and condemning entrance of PMC into this area, submitted by local 392, MMSW, was ruled out of order by Clarence L. Palmer, state CIO president.

From the Murray, Tintic and Midvale auxiliaries came a resolution condemning the action of the MMSW executive board in removing the international auxiliary president, Mrs.

Mary Orlich, without a vote from the women. The resolution was adopted.

★ Nonferrous metal mining in Utah reached a new postwar peak of activity during the first quarter of 1948, according to a survey completed by the Bureau of Economic and Business Research, University of Utah School of Business. Manpower and equipment shortages "had largely disappeared and development work in many of the mining areas had been completed" by the end of the quarter.

★ The annual report for 1947 of New Park Mining Co., Keetley, stated total revenue in 1947 was $1,861,311, as compared with $1,551,668 the previous year.

★ Utah iron ore production during March was 229,131 tons, compared with 286,416 tons in February. The drop was due to coal mine suspension.

★ No lives were lost but one $50,000 electric locomotive was damaged severely, two damaged less severely and one slightly in a smashup May 27 at the Kennecott Copper Corp. central yards at Bingham. One locomotive was pulling two others to the shop for electrical repair of damage caused earlier in the day by lightning. They got out of control and were traveling about 35 mph. down a 4% grade. They overshot the yard and continued along an upgrade track on which an ore train was moving down from one of the upper mine terraces. Halted by signal lights, the ore train locomotive, nonetheless, was jammed back 6 ft. into the ore car by the impact.

★ A golf course, field house, tennis courts, baseball diamond, playground equipment and wading pool are included in the Magna community center maintained by Kennecott Copper Corp. for its employees and their families.

★ A 10-year record of no fatalities at the Magna mill of Kennecott Copper Corp. was broken May 16 when C. M. Carrol, Crescent, was crushed between a moving crane and a bucket elevator at the mill. A companion, Siegried E. Bassler, suffered a fractured arm.

IDAHO

Northwest Gypsum develops gypsum deposit—Diesel motors tried at Triumph for underground haulage

★ The Coeur d'Alene mining district produced $10,628,626 in assessable net profits for the year 1947, according to sworn statements filed with the county assessor of Shoshone County, as compared with $4,565,151 in 1946.

★ The Lincoln Mining Co., a nonoperative corporation, has received royalties amounting to $52,080.28 from

SAFE!

AND SAVING

VINYL Plastic Coated Mine Vent Tubing

Now Packed in Fibre Drums

Top protection for mines and miners . . . here's the ventilation tubing that WON'T BURN! ! ! Jute or duck fabric, coated and impregnated with special vinyl plastic compound, is flameproof to completely eliminate a fire hazard. Super-tough, too, to resist all common causes of tubing failure and assure a continued supply of fresh air where it's needed. Saves money because it lasts longer, won't mildew, fights chemical action, weighs less for easier installation and lower shipping costs. Now shipped in Stapak fibre drums for protection, easier storage, convenient underground handling. Send for Bulletin 107 and ask for free samples.

Made by the manufacturer of famous ABC Brattice Cloth in various grades.

AMERICAN BRATTICE CLOTH CORP. WARSAW, INDIANA

"Foiled Again"

BY
SKOOKUM
SLUSHER
BLOCKS

If you were Micky Moisture or Mack Muck you would look frustrated too. Because SKOOKUM Slusher Blocks just can't be entered by these cheerful little spoilers.

SKOOKUM Slusher Blocks are sealed by a patented method against the ruinous effects of muck and moisture. See how it is done. Look at illustration below. Then call, wire or write for location of your nearest SKOOKUM Distributor.

Skookum's patented bearing adjustment and locking device locks out dirt, muck, moisture.

SKOOKUM
COMPANY, Inc.
8504 N. CRAWFORD ST.
PORTLAND 3, OREGON

Idaho *(Continued)*

the Silver Dollar Mining Co. which holds a 99-year lease on Lincoln mineral holdings, according to Franklin Pfirman, secretary. Silver Dollar's income is derived from a one-third interest in the "Rotbart" area being mined by Sunshine.

★ The Douglas Mining Co. has recently done considerable drifting and crosscutting on the 600 level, crosscutting to the Marmon vein and drifting on the Douglan, according to Stanly A. Easton, secretary. The Marmon vein developed no commercial ore at the point of intersection, but drifting on the Douglas vein has developed 150 ft. of commercial grade zinc-lead ore.

★ Sidney Mining Co., in the Pine Creek district, is now completing a raise from its Red Cloud tunnel level 400 ft. to the present productive level, and when this is completed all production will be from the Red Cloud tunnel, eliminating costly truck haulage. W. T. Simons is president of the company and Malcom Brown, mine superintendent.

★ The Northwest Gypsum Co. has developed a deposit of gypsum on the Snake River near Weiser, Idaho, 60 to 140 ft. wide and half a mile long, according to William T. Smith, secretary and treasurer. There are two varieties of gypsum in the deposit: one carries 50% sulphur trioxide and is suitable for fertilizer; the other is crystalline gypsum, which is snow white and suitable for commercial purposes. The company has opened two large quarries and is now working on three more with the intention of producing from 1,000 to 3,000 tons per day.

★ The Triumph mine at Hailey is the first Idaho mining property to try out underground haulage with diesel motors, according to George McDowell, State Mine Inspector. The U. S. Bureau of Mines contends that diesel underground haulage, when properly installed, is safer than trolleys or battery operated trammers. If the Triumph operation is succesful, the Nabob mine in this district will consider a similar installation for their long crosscut tunnel, which will be over a mile in length.

★ Sunshine Mining Co. has recently made a new discovery of silver-copper ore by the continuation of an old drift on the 3100 level in ground known as the "Intervening Area," and which is owned jointly by Polaris and Sunshine. This area has been rich in its upper levels and has been in production for several years under a contract by which Polaris retained 60% below the same level. It was thought the deposit had been worked out until the present unexpected development.

★ The Silver Crescent Mining Co. is resuming mining development on Moon Gulch after several years of inactivity. The company completed a shaft to a depth of 550 ft., constructed a 150-ton flotation milling plant and milled considerable ore prior to closing down. Henry Allen is in charge of operations and the company has levied a one cent assessment to meet expenses.

★ The University of Idaho college of engineering and school of mines is undertaking experiments under direction of L. A. Jobe, of the chemical engineering department, in the separation and purification of Idaho monzanite sands. Prime objective of the research will be to determine if the rare earth constituents can be successfully separated locally at a reasonable cost.

★ Dr. H. C. Mowery, newly elected president of the Coeur d'Alene Mines Corp. has employed 3 prominent district geologists, Roger McConnell, of the Bunker Hill & Sullivan; Robert Sorenson, of the Hecla, and Philip Shenon, of the U. S. Bureau of Mines, to make a thorough study of the Coeur d'Alene Mines property. Their combined recommendations will be followed in further prospect development work. The company has been unable to locate commercial sized orebodies below the 2000 level. Ore found here has been scattered and in kidney form. The company has 3 known vein structures, 2 of which have been slightly prospected, and has an interest in a long crosscut prospecting development which is driving through a potential mineralized territory from the 2800 level in the Coeur d'Alene Mines shaft. From workings above the 2000 level, the company paid dividends totaling $550,057.

★ The Sullivan Mining Co. has put down 8 diamond drill holes on the Metaline & Pine Creek Consolidated property and is entitled to take up 312,561 shares of the company's stock at 10c. per share in payment for the work performed, according to Frank J. Luedke, president of Metaline & Pine Creek. The latter company owns 7 patented mining claims, 32 unpatented claims and 160 acres north of and adjoining the Pend Oreille property, and also owns 36 unpatented claims and 1,100 acres in the southern end of the Metaline district. The Sullivan company plans to continue diamond drill work on the property throughout the summer, says Luedke.

★ After completing the sinking of a 500-ft. shaft, the Thomas Mines Co., adjoining the Dayrock mine north of Wallace, has started driving a crosscut north to cut a wide sheer zone system and a crosscut south to prospect the possibilities between the two properties.

★ Zanetti Brothers, of Wallace, operators of several custom mills, have leased placer ground on Prichard Creek in the Murray district, formerly dredged by the Yukon Dredging Co., and will operate with a steam shovel on several bars and benches that were

untouched by the dredge because of inability to purchase mining rights.

★ An important lead-silver strike in the Wood River district on Baltimore Trust mine property was announced early in June by Frank R. Plughoff of Hailey. Assays by A. L. Hall of Triumph showed 55.1% lead, 2.9% zinc, 59.3 oz. silver and .03 oz. gold.

★ Lucky Friday Silver Lead Mining Co. at Mullan has unearthed a body of high grade ore in starting stopes from the 1400 level. Solid ore is 4 ft. wide and assays 41% lead and 200 oz. of silver per ton. Production is being maintained at 50 tons a day.

MONTANA

Placer strike is reported near Helena—Beet sugar processors may use zinc instead of lime

★ A placer strike has been reported in the Oro Fino channel on the southern edge of Helena, where work is carried on by C. B. Mitchell and associates in a 65 ft. shaft, 21 ft. into bedrock. The sand on the 40-ft. level is reported to carry $30 per cu. yd.

★ Kuno Doerr, Jr., manager of the East Helena plant of the A.S.&R. Co., will address the Tenth Summer Convention of the Mining Association of Montana at Virginia City, July 30-31, on "The Relations of the Custom Smelters to the Small Mining Operators." Additional speakers will be Ray H. Summer, Denver, regional manager of the explosives division of the E. I. duPont de Nemours & Co., and Dr. Francis A. Thomson, president of the Montana School of Mines and director of the Montana Bureau of Mines and Geology. Ross D. Leisk, Kellogg, Idaho, manager of the Sunshine Mining Co., will give a talk on "The Future of Silver." Other speakers expected to address the Virginia City gathering include John D. Sullivan, Columbus, Ohio, assistant director of Battelle Memorial Institute; Rowland King, Spokane, president of the Northwest Mining Association; Dr. George A. Selke, Helena, Chancellor of the University of Montana; J. W. Melrose, Spokane, geologist for the Milwaukee Railroad, and Sheldon Glover, Olympia, Wash., supervisor of the division of mines and mining of the Conservation and Development Department of the State of Washington.

★ Montana beet sugar processors may decide to use zinc hydrosulphite instead of lime in refining their product, said H. W. Ansell, Salt Lake City, general traffic manager of the Utah-Idaho Sugar Co., at a hearing before the Montana Railroad Commission in Helena to decide whether to raise intrastate freight rates to coincide with the increase granted railroads in inter-

Footage
that counts
For speed, footage and high diamond salvage, choose the JKS HARDHED 55 Tungsten-Carbide Matrix Diamond Bit.
Choose HARDHED 55 Core Bits for drilling in broken, irregular or coarse-grained formations. The tough, powdered metal matrix resists the action of hard and abrasive cuttings. This free-cutting bit gives faster than normal drilling speed.
FEATURES OF HARDHED 55
1. Select quality diamonds
2. Extremely hard, tough matrix
3. Matrix gives maximum diamond support
4. Scientific diamond pattern
5. Careful diamond setting
Result:
Lowered drilling costs per foot.
Catalog on request.
J. K. SMIT & SONS
157 Chambers St., New York 7, N.Y. 129 Adelaide St., Toronto, Ont.

Save up to 75% over gasoline costs

WITTE DIESELECTRIC PLANTS

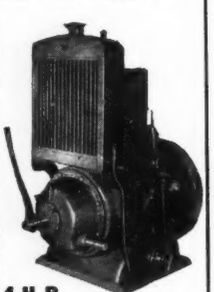
NEED NO GASOLINE

You have problems enough on all your projects without the handicaps and annoyance of insufficient—or unreliable—electric power and light. Gasoline storage, explosion and fire risks are worries, too. So, whether you need low cost electric power and light, or inexpensive, dependable engine driving power, it's a real load off your mind to provide the electric power and light you need, or the engine power, with inexpensive, non-explosive Diesel fuel oil. The same fuel used in Diesel locomotives starts and operates WITTE Diesel Engines and Dieselectric Plants. They occupy little space, are safe for operation in confined places, even underground.

3 KVA Radiator-Cooled WITTE Dieselectric Plant

Make Yours an ALL-Diesel Operation — Cut Your Costs Keep Gasoline Off Your Jobs!

The steady, trouble-free operation of your WITTE Dieselectric Plant gives you day-bright visibility on underground or night-time work; abundant electric power for small motors, hand-tools and other equipment. Easily mounted on skids, WITTE Dieselectric Plants or WITTE Diesel Engines can be quickly moved to new working locations as desired.



4 H.P. WITTE Diesel Engine

See a WITTE Demonstration

Factory-tested 100% for power and performance, your WITTE Diesel unit requires little care or fuel—no bulky storage facilities needed. Built for heavy duty they measure up to their world-wide reputation for amazing dependability, year after year. See a WITTE in operation—wherever you are there's a WITTE Dealer in easy reach.

There's a Size to Fit Your Needs

WITTE Dieselectric Plants range from 3 to 10 KVA-AC; 2.5 to 8 KW-DC—WITTE Diesel Engines from 4 to 12 H.P. Radiator and fan or tank-cooling; vertical and horizontal models. Few parts ever require replacement, but are always readily available and easily installed when needed. Your WITTE Dieselectric Plant or WITTE Diesel Engine will be making money and saving important time for you years after returning original cost. Write today for descriptive literature.

WITTE ENGINE WORKS

DIVISION OF OIL WELL SUPPLY COMPANY — UNITED STATES STEEL CORPORATION SUBSIDIARY

AMERICA'S PIONEER BUILDER OF SMALL DIESELS — KANSAS CITY 3 MO. U.S.A.

Montana *(Continued)*

state commerce a few weeks ago. Mr. Ansell stated that for a normal sugar beet factory, only one carload of the zinc compound would supply the factory for the entire grinding season, as compared with many carloads of lime on which a raised freight rate is proposed.

★ Minah Development Co., subsidiary of the Denver Development Co., operating the Minah mine near Wickes, Jefferson County, is shipping 3 carloads of gold-silver-lead sulphide ore to the East Helena smelter each month, and also continuing development work. Alfred E. Nugent is managing partner at the Minah.

WASHINGTON

Assistant Secretary Davidson discusses Russell Bill—Talc production near Marblemount increases

★ C. Gerard Davidson, Asst. Secretary of the Interior, at a round-table discussion held in Spokane recently under the sponsorship of the Northwestern Mining Association, declared that the Department could not support the Russell Bill in its present form. Pointing out that the bill does not limit incentive payments to increases in total production of a given company as distinguished from production of individual mines, and therefore might divert manpower and facilities to marginal operations and decrease total production, Mr. Davidson stated the Department's position as follows:

"We believe that the Government agencies procuring directly for the stockpile should, where necessary, pay prices above the going market rate if this results in obtaining a supply which would otherwise not be available. We believe that such payments should be used where feasible to encourage industry to develop the techniques and facilities for utilizing low-grade domestic ores which have heretofore been unprofitable to mine. . . .

"Further, we favor incentive payments for additional exploration and development provided the terms, conditions and benefits for such payments are adequately defined in the law and proper standards are prescribed. Such payments might well be on the basis of the Government matching private expenditures for this purpose."

The Asst. Secretary denied the validity of criticism aimed at the Interior Department for delays in issuing mineral land patents due to a preference for the mineral leasing system. He stated that an effort on the part of the Department to decentralize the operations of the Bureau of Land Management had been blocked by Congress.

"On the one hand decrying the inefficiency of the Bureau of Land Management, Congress would deny this Bureau the tools with which to increase efficiency. By prohibiting field decisions, Congress has precluded the possibility of handling promptly mineral land patents and leases.

"So serious is the situation that this year it became necessary in some cases for the mining industry to provide assistance to field offices of the Bureau in the processing of regular work."

Mr. Davidson reported that much ground-work has been done on the Department's phosphate program; that plans are being made for experimental work on utilizing Northwestern phosphate rock to produce not only fertilizer raw materials, but large quantities of vanadium and fluorine as well.

E. C. Stephens, Anaconda Copper Mining Co., pointed out that premium prices would mean greater Federal controls over mining. Other speakers at the round-table meeting included Frank N. Marr, chairman of the Spokane Chamber of Commerce Mining Bureau and head of Spokane-Idaho Mining Co.; C. O. Dunlop, Silver Dollar Mining Co.; and Roger O. Oscarson, executive secretary of Northwestern Mining Association.

★ William Soren, operating a talc mine in northwestern Washington near Marblemount, has increased production to the rate of a full railroad car daily, after taking out 30,000 tons last year. Talc is trucked a mile to a shipping point on the Rockport-Newhalem railroad where it is crushed and shipped to Seattle for processing.

★ Construction, supervised by the State Highway Dept., is expected to be completed this fall on one section of a major mine-to-market road, east of Marblemount on the Cascade River. The present section is 7.6 miles long with 9 log bridges and the cost is estimated at $160,000. When completed, the road will extend 21.6 miles east of Marblemount to within about 12 miles of the Stehekin River road on the other side of the Cascade Mountains. No road crosses the Cascades at this point. The road will open up a rich mining area presently mined only with the aid of pack animals over mountain trails.

★ Six potlines at Permanente Metal Corp.'s Mead plant are operating at capacity. Recently the rolling mill produced 1 million lb. of aluminum in a day, and some ingots now weigh more than 5,000 lb. However, production of aluminum is far behind demand. J. H. Lindemuth, general superintendent of Mead's reduction plant, reported in Spokane that the emergency plane-building program will take about 20% of the Spokane plants' production and indicated that additional plants cannot be constructed because of power shortage. He said Permanente is now producing 20% of the aluminum in the U. S., Reynolds 29.5% and Alcoa 50.5%.

Reports from Helena, Mont., are that Henry J. Kaiser of Permanente

Metals Corp., wno operates the aluminum plants at Spokane, has optioned a property containing lime rock and silica just south of Helena. It is believed a Kaiser company will build a cement plant there.

OREGON

★ Horsehead Lime Corp. will produce chemical lime near Williams in Josephine County. Operations were to start about June 1, upon completion of the company's rotary kiln.

★ The State Department of Mineral Industries made investigations of 3 nickel-bearing laterite deposits in 1947—the Red Flat in Curry County, the Woodcock Mountain in southwestern Josephine County, and the Nickel Mountain in southern Douglas County.

★ A 100-ft. inclined shaft is being sunk by George Tulare to prospect a vein at the Sylvanite mine in Jackson County.

★ El Rio Dredging Co., having leased almost 150 acres in Jackson County, has started operations with dragline and dry land washing plant, near Takilma, according to the Oregon *Ore-Bin*.

CALIFORNIA

California Iron and Shasta companies awarded flood damage—Perlite plant operating at Campbell

★ Discovery of high-grade gold ore at the Yankee John mine in Shasta County has been reported by Olaf P. Jenkins, chief, State Division of Mines. The strike was made by Sidney Smith and Norman Lane, lessees currently at work in the mine on the 100-ft. level. The gold is readily visible to the naked eye and is rich enough to be recovered by hand methods. An ounce of silver accompanies each ounce of gold. Several tons of high-grade ore is awaiting treatment.

★ Rehabilitation is progressing under the management of W. C. Ennis at the Monarch gold mine near Sierra City, where a substantial tonnage of milling ore is said to be available in old workings. The property was recently acquired by Hugh Brown, V. V. Velasco and associates. Plans include replacement of the old 5-stamp mill with a larger, more efficient reduction plant.

★ California Iron Mines and Shasta Iron Co. have been awarded $407,825 by a Federal Court jury in Sacramento for flooding and damage to their properties following completion of Shasta Dam. The Government rejected claims for $1,450,000 damages by the companies. A number of copper mines in the Copper City and

MINING, MILLING
SMELTING & REFINING
PLANTS

—

DESIGN & CONSTRUCTION

PARSONS

Any Plant
Any Size
Anywhere

The Ralph M. Parsons Company
Engineers • Constructors

617 SOUTH OLIVE STREET, LOS ANGELES

SAN FRANCISCO
2017 RUSS BUILDING

WASHINGTON
1025 CONNECTICUT AVENUE

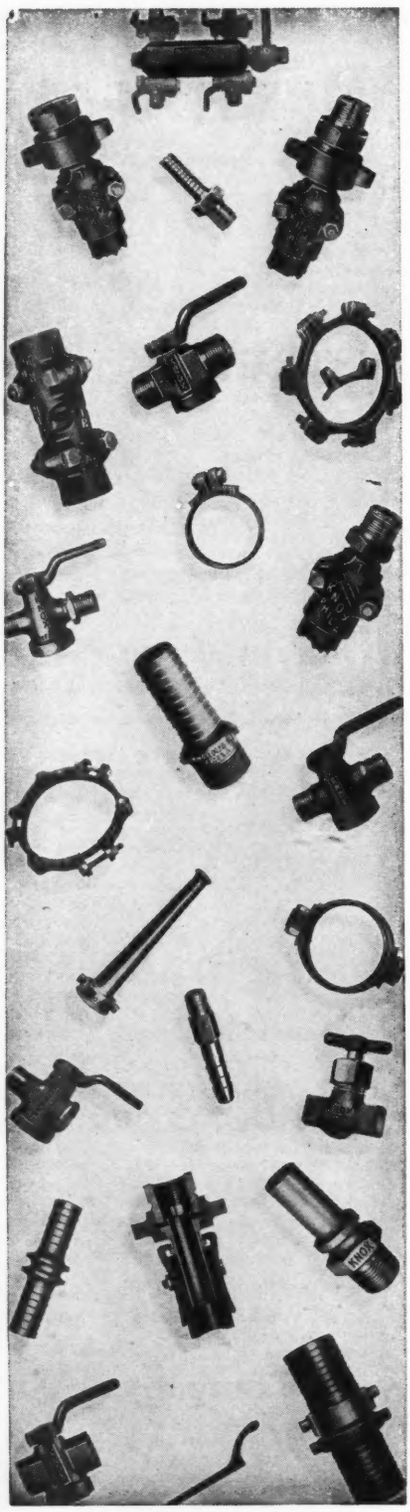
HOUSTON
3401 BUFFALO DRIVE

Write for your copy of the

KNOX

Valves - Couplings - Nipples - Clamps - Menders

CATALOG



KNOX MANUFACTURING CO.

812 Cherry St. Phila. 7, Pa., U. S. A.

SINCE 1911 PRODUCERS OF

KNOX

Valves - Couplings - Nipples - Clamps - Menders

California *(Continued)*

Kennett districts are reported to have been submerged or seriously damaged by filling of Shasta Dam reservoir.

★ California Division of Mines reports a plant for processing perlite for light weight aggregates is in operation at Campbell, Santa Clara County. It was operated during 1947 on an experimental basis and limited production reported for the first quarter of 1948. Full production was expected by the middle of June. The plant is operated by the National Perlite Company, Mr. A. G. Keating, president.

ALASKA

Many dredge operations under way, others in preparation—Good antimony samples at Stampede

★ Two and a Half Mining Co. plans operations on Confederate and Montana creek claims in the Fortymile area.

★ Lee Brothers Dredging Co. was doing preparatory work in May at Nome for operation of two dredges at Solomon.

★ Cleary Hill Mines Co. of Fairbanks did diamond drill work during the winter. Placer operations are proceeding at Tofty under R. C. Wyer.

★ Alaska Mining Co., Inc. has advanced about 1,600 ft. at Ester, opening a number of veins ranging from 16 in. to 3 ft. in width.

★ Cheechako Mining Co. plans to build a mill at its gold-silver property north of Fairbanks, and buildings at the camp recently destroyed by fire will be rebuilt.

★ An estimate of two cars of high grade ore and concentrate per week has been made for Stampede Mines, Inc. at Stampede. Ore samples at the antimony property range from 15% to 60%. A new $100,000 plant is planned, and enough ore for 4 years' operation at the mill is said to be blocked out.

★ U. S. Smelting, Refining & Mining Co.'s Alaska Division was reported at the end of May to have Dredge No. 3 at Chatanika, No. 8 at Goldstream, and No. 10 at Cripple operating. No. 6 at Ester was preparing to resume operations and No. 5 was being reassembled at Little Eldorado.

CANADA

Quebec land surveyors' fees are increased—New road to Red Lake area proposed

★ According to the Dominion Bureau of Statistics, Ottawa, Canada's production of leading minerals for the three months ended March 1948 was as follows: asbestos, 159.283 tons; copper, 121,276,964 lb.; feldspar, 11,393 tons; gold, 823,029 fine oz.; gypsum, 259,676 tons; lead 73,019,966 lb.; lime, 242 024 tons; nickel, 61,871,992 lb.; salt, 162,448 tons; silver, 3,094,079 fine oz.; zinc, 106,581,170 lb.

★ From January through April, 1948, Canada exported 976 tons of ore with lead content, all of which was shipped to the U. S., it has been reported by American Bureau of Metal Statistics. Refined lead exports for the same period totaled 32,526 tons. with 17,627 tons going to the U. S., 160 to Brazil, 1,473 to France, 521 to the Netherlands, 12,369 to the United Kingdom, 10 to China and 366 to other countries.

Ore with zinc content exported to the U. S. was 14,998 tons from January through April of this year. During this period slab zinc shipped out of the Dominion amounted to 38,703 tons, with 21,838 tons to the U. S., 50 to Brazil, 1,120 to Germany, 67 to the Netherlands, 15,135 to the U. K., 325 to India and 168 to other countries.

★ Alan Cockerman, South York, recommended the appointment of a full-time Minister of Mines, Forests and Scientific Services at a budget debate in the House of Commons recently. Among activities covered by Mr. Cockerman's suggested program for such an office were the study and development of the existing supply of strategic minerals from the standpoint of domestic and continental defense; a review of labor demands of the mining industry with the Labor Minister, as well as considering with the Minister of Immigration the further absorbing of immigrants by the industry; the establishment of a national policy with regard to processing primary mineral products based on domestic and foreign demand.

★ Saskatchewan, the last of the provinces to take such action, has now lifted wartime controls on the search for and development of radioactive minerals.

QUEBEC

★ Quebec Department of Mines has released geological report No. 23 on the investigation of 750 sq. miles in Labelle and Gatineau Counties in the less rugged regions of the Laurentian highlands. The report includes a comprehensive study of the following metallic minerals: copper, iron, ochre, molybdenum, nickel, and gold; nonmetallics: asbestos, apatite, clay beryl, limestone, marble feldspar, fluorite, graphite, garnet, mica, quartz, talc, granite, syenite and limestone.

★ Increased rate of pay for Quebec land surveyors has been established by the Provincial Government. Surveyors may now charge a minimum of $25 per day, or fraction of a day, for professional services or travel, plus $7 for each additional hour.

Land surveyors are entitled to re-

imbursement for traveling expenses or any labor they may employ; $2.50 for every boundary established in accordance with law, as well as cost of the boundary post; $10 for every procès-verbal drawn up according to law, plus $2.50 for every 100 words after the first 500.

★ Photographic Survey Co., Ltd., Toronto, recently announced air survey contracts covering 21,700 sq. miles in Quebec and Labrador, which will require 4 aircraft of the company's fleet operating out of Fort Chimo and Knob Lake for at least 2 months. The largest contract is for photographing 19,650 sq. miles south of Fort Chimo for the Federal Department of Mines and Resources. The remaining 2,000 sq. miles represents a cooperative project of the Quebec Labrador Development Co., Ltd., Fort Chimo Mines, Ltd., and Fenimore Iron Mines, Ltd.

ONTARIO

★ The Ontario Minister of Mines announced late in May discovery of radioactive ore 90 miles north of Cochrane in the James Bay basin. The extent of the field and exact nature of the deposits were to be reported on further after examination of deposits in an old river bed in Pitt Township. Surveys carried out in the past in this area were for exploration of lignite deposits. Two veteran prospectors, Alex Mosher and Fred Austin, were credited by the Mines Department with the discovery; at the time of the announcement over a hundred claims had been staked.

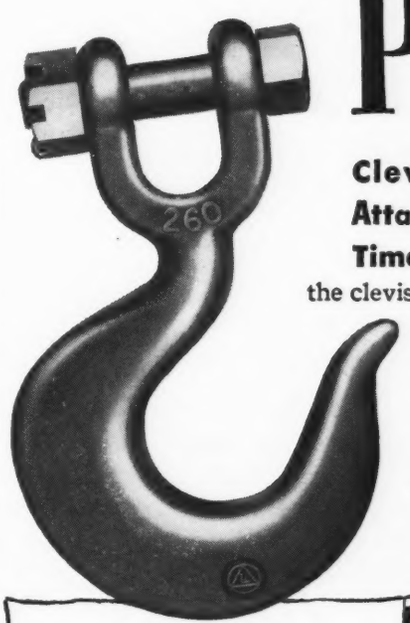
★ McIntyre Porcupines Mines, Ltd., in its annual report for the fiscal year ending March 31, 1948, showed value of gold and silver on hand at $6,482,126, as compared with $5,887,437 at this date last year. Grade of ore treated was some better and tonnage slightly larger than in the previous fiscal year. The company did not develop as much ore as was mined, and no large scale development is contemplated at this time. Outside exploration has been chiefly prospecting and reconnaisance work. McIntyre has eliminated from its ore reserve estimate all blocks grading below current operating costs because of the continuing increase of these costs.

★ An eight-mile road connecting the new Red Lake highway and airport reportedly has been laid out and will be constructed soon. Among properties in the vicinity which should benefit by the project are Detta, Dickenson, Dexter, Campbell, and Marcus.

MANITOBA

★ The annual report of Sherritt Gordon Mines, Ltd. for the year ending December 31, 1947, reveals that 359,131 tons of ore was mined and hoisted from which was produced 14,683,465 lb. of copper, 3,682 oz. of gold, 121,343 oz. of silver and 8,217 tons of zinc

Here are Hooks that hoist your Profits!



Clevis Hoist Hook Is Quickly Attached . . . Changed . . . Saves Time and Labor. Slip the bolt through the clevis, spin the nut, spread the cotter and this heat-treated hook's ready and safe for your toughest jobs. No welding, no spelter, no connecting fittings required. Send for Laughlin's famous data book of industrial fittings... Catalog No. 140.
THE THOMAS LAUGHLIN CO., DEPT. 5, PORTLAND 6, MAINE.

Laughlin Safety Hook . . . "The Latch Locks The Load" . . . adds a big safety factor to every lift. Sturdy latch, stainless steel spring. For every industrial application.

Laughlin Replacement Swivel Hook Assembly with Safety Latch. Bolts on and off . . . no machining . . . no threading. For hoists, cranes, lashing operations. One-ton and half-ton sizes.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

A 20 h.p. Sauerman Slackline Cableway operating a small bucket on 1,000 ft. track cable, reclaims tailing from dump in valley to bin on hillside above mill.

At a phosphate processing plant, a 2½ cu. yd. Sauerman Scraper operating as a slackline, reclaims slurry from soaking pit to hopper, besides dragging newly mined matrix out into pit to soak.

ECONOMIZE
by moving materials the SAUERMAN way

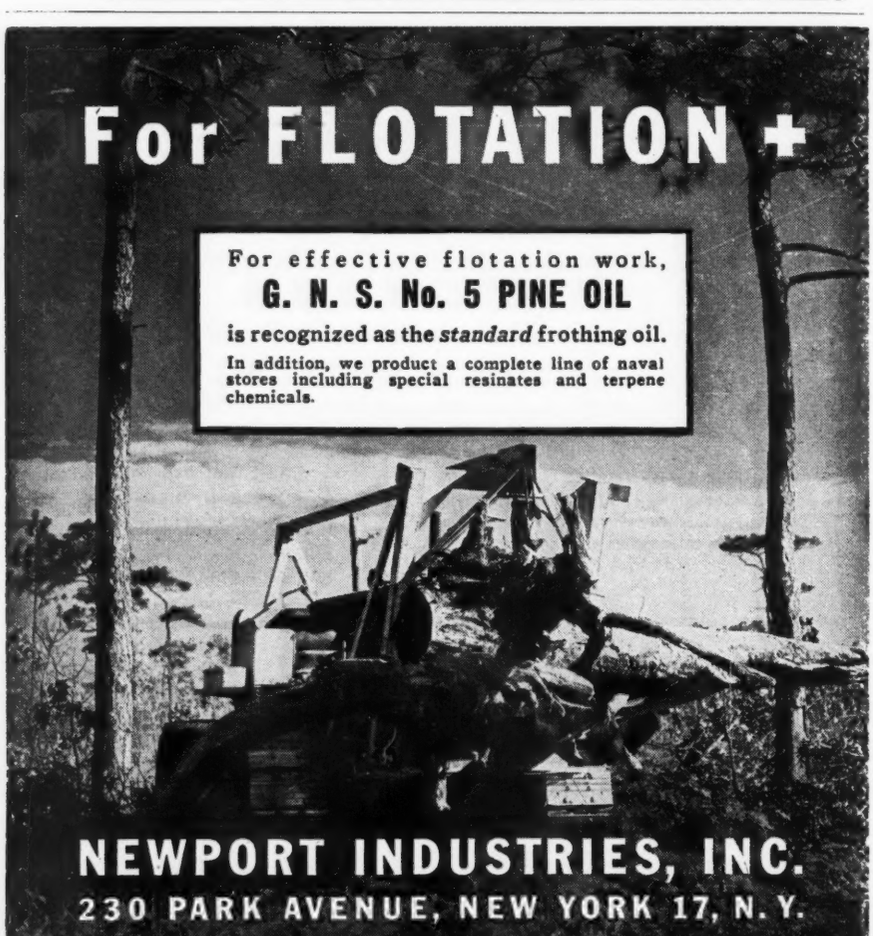
Large savings follow the use of Sauerman Scrapers and Cableways in stripping, stockpiling and similar dig-and-haul work where their long operating range gives these machines an advantage over many other types of material handling equipment.

With one man at the controls and with relatively small expenditure of power, a Sauerman machine will dig, haul and dump a large hourly tonnage of any class of earth or bulk material.

Morevover, the cost of the equipment is moderate, upkeep is simple. Altogether the costs add up to only a few cents for each ton of material handled.

Write for the complete Sauerman illustrated catalog.

SAUERMAN BROS., Inc.
584 S. Clinton St., Chicago 7, Illinois


For FLOTATION +
For effective flotation work,
G. N. S. No. 5 PINE OIL
is recognized as the standard frothing oil.
In addition, we product a complete line of naval stores including special resinates and terpene chemicals.
NEWPORT INDUSTRIES, INC.
230 PARK AVENUE, NEW YORK 17, N. Y.

MANITOBA (*Continued*)

concentrate. Production was substantially curtailed by a 98-day strike shutdown during the latter part of the year.

The net profit for the year of $1,249,808 was the highest in the history of operations, largely due to the liquidation of the inventory of copper in process during the last half of the year. This inventory had of necessity to be built up again after the mine resumed operations. Operating costs were $4.554 per ton milled and 11.133 c. per lb. copper, both figures being materially higher due to shutdown expense. All ore mined came from the West mine with 14% being from the recovery of pillars and sills between 6th and 1st levels.

No new ore was found during 1947 and ore reserves were reduced by the tonnage milled. Total ore reserves amount to 1,008,000 tons averaging 2.60% copper, 1.99% zinc, 0.021 oz. gold and 0.65% silver per ton. Pillars and sills account for 269,000 tons, a large part of which may prove difficult and costly to recover. The company expects to mill between 400,000 and 450,000 tons during 1948.

At Lynn Lake the company's operations during 1947 consisted mainly of geophysical exploration, diamond drilling and surface construction work. Two new nickel-copper orebodies, the "EL" and the "C" and a copper-zinc deposit were discovered. Geological mapping was completed to the north end of the property and a considerable portion of the south claims were also mapped. Eight hundred miles of line were covered by geophysical control survey work, 450 miles being by electro-magnetic survey and 350 miles by magnetometer. A total of 85,373 ft. of diamond drilling was performed on Lynn Lake occurrences during 1947 and the nickel-copper ore reserves were increased by some 3,326,000 tons over those indicated at the close of the previous year. The results of the last half of the year were disappointing and ore reserve additions during this period were relatively small.

The calculated total tonnage and average metal content for all orebodies to a depth of 1,000 ft. is 8,300,000 tons, averaging 1.514% nickel and 0.687% copper. In addition the "Z" deposit is estimated to contain 153,000 tons averaging 1.113% copper, 2.491% zinc and 0.16% per ton gold.

The company plans to continue geophysical exploration and surface diamond drilling during 1948. A 5-compartment shaft will be sunk to the 1,000-ft. level and underground exploration initiated on known orebodies. During the latter part of the year, when ore is available from underground, a pilot mill will be operated continuously at Lynn Lake. The company anticipates an exploration expenditure of $1,300,000 in 1948.

Pilot mill testing of 780 tons from the Upper "A" orebody resulted in improved recovery but lower concentrate grade as compared with laboratory testing. Laboratory test work on

diamond drill rejects from the "EL" orebody indicated that this ore is amenable to treatment and that satisfactory recoveries can be achieved.

★ Production at Hudson Bay Mining and Smelting Co., Ltd. continues at a rate of 5,100 tons a day, and during the first quarter of the year 465,482 tons were milled. Estimated net earnings, after deducting all operating costs, administration, depletion, ore royalty and taxes, were $3,352,241.

★ At present approximately 70% of the ore comes from Saskatchewan and 30% from Manitoba. At the annual meeting R. H. Channing, president, stated that the zinc residue testing would likely be completed during the next year. The pilot plant treatment is being increased to 30-40 tons per day to obtain additional information about recoveries. Small recoveries of lead may be made as well as zinc, gold, silver and copper. The major portion of the company's present zinc production is "four nines plus" (99.99%), which demands a premium over ordinary electrolytic zinc.

★ International Nickel Company of Canada, Ltd. has announced plans for a large-scale exploration program at its Lynn Lake holdings during the forthcoming summer. Diamond drilling and geophysical investigation will be undertaken on anomalies discovered during the last year's field investigation. Work will be concentrated on the main group of claims held by the company to the east of the Sherritt Gordon ground.

★ God's Lake Gold Mines, Ltd. announces that it is considering abandoning the original Elk Island property at God's Lake. During the past year the company has spent in exploration approximately $117,000 on its 147 mining claims in the Lynn Lake area. Intersections of copper, zinc and some gold have been obtained but no continuous body of ore has been reported.

BRITISH COLUMBIA

★ During the 5 weeks ending May 29, the following shipments of custom ores and concentrates were received at the Trail smelter of the Consolidated Mining and Smelting Company of Canada, Ltd.

Lead Ores—Centre Star (Wesko), Ymir, 45; Highland-Bell, Ltd., Beaverdell, 514; Bosun, New Denver, 30; Protection, Ymir, 164; Silver Giant Mines, Ltd., 113; Moonlite Mining Co., Colville, Wash., 5.

Dry Ores—Midnight, Rossland, 32; I.X.L., Rossland, 17; Kootenay Belle, Sheep Creek, 105.

Zinc Concentrates — Base Metals Mining Corp., Ltd., Field, 703; Goldfields Consolidated Mines Co., Northport, Wash., 688; Zincton Mines, Ltd., Zincton, 1,010; Western Exploration Co., Ltd., Silverton, 333; Ainsmore Consolidated Mines, Ltd., Ainsworth, 50; Britannia Mining and Smelting Co., Ltd., Britannia Beach, 604; Mercantile

I'M YOUR MAN

WITH AN AMAZING NEW RATCHET-OPERATED "VIC-GROOVER"!

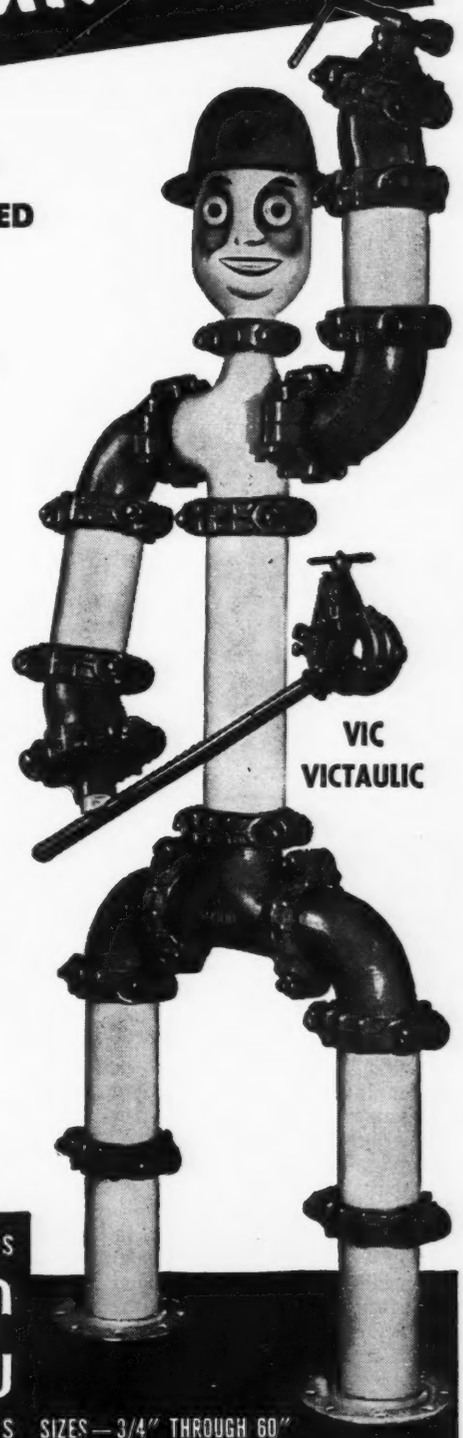
VIC-GROOVER is a newly developed tool for grooving the ends of pipe to take Victaulic Couplings... and you can get it today!

The handy, ratchet-operated VIC-GROOVER is light-weight for ease of carrying...and it makes its groove at exactly the right spot, to exactly the right depth, *automatically!*

COMPARE VIC-GROOVER with any regular pipe threader and you'll find it takes only half the effort to operate—*and half the time!*

Now it is easier than ever to make your piping system all-Victaulic easily, quickly, cheaply with VIC-GROOVER and Victaulic Couplings and Victaulic Full-Flow Elbows, Tees and other Fittings.

Write today for the "VIC-GROOVER Catalog"!



SELF-ALIGNING PIPE COUPLINGS
VICTAULIC
EFFICIENT FULL FLOW FITTINGS SIZES—3/4" THROUGH 60"

VICTAULIC COMPANY OF AMERICA
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Victaulic, Inc., 727 W. 7th St., Los Angeles 14, Calif.
Victaulic Company of Canada, Ltd., 200 Bay St., Toronto 1
For export outside U. S. and Canada: PIPECO Couplings and Fittings:
Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.
Copyright 1948, by Victaulic Co. of America

the new
BOOTH *Flotation* MACHINE

• MORE AIR
• LESS REAGENTS • TOP PERFORMANCE
Two impellers provide unequalled aeration and pulp circulation.
FOR MEN WHO KNOW FLOTATION BEST
Write for Information
BOOTH ENGINEERS
72 West Second South • Salt Lake City, Utah

British Columbia *(Continued)*

Metal and Ore Corporation, Hong Kong, China, 175; Highland Leasers, Ainsworth, 55.

Lead Concentrates—L. D. Besecker, Kaslo, 14; Zincton Mines, Ltd., Zincton, 52; Western Exploration Co., Ltd., Silverton, 76; Ainsmore Consolidated Mines, Ltd., Ainsworth, 55.

★ Employees at the Trail smelter and Sullivan mine and mill have approved a new agreement reached between the Consolidated Mining and Smelting Company of Canada, Ltd. and the IUMMSW, providing an increase of 12½c. per hour for all workers on hourly wages, an increase in shift differentials from 3c. and 5c. per hour for afternoon and night shifts to 4c. and 8c. respectively, and extension of vacation privileges to 2 weeks for each employee after 2 years' service. Increases are retroactive to March 1.

★ The Aluminum Company of Canada, Ltd. is considering the building of a large aluminum plant on the British Columbia Coast. R. W. Powell, president, has spent the past month inspecting proposed sites. Three most probable are: the head of Bute Inlet, where it is believed 1 million h.p. can be developed by diverting water from Chilco and Taseko Lakes; the head of Dean Channel, near Ocean Falls; and the mouth of Kemano River, 100 miles south of Prince Rupert. If a site is selected, Mr. Powell states the company plans to spend approximately $1 million on an engineering survey to draft a development plan.

★ Production of Polaris-Taku Mining Co., Ltd., Atlin district, was 3,000 oz. gold during the month of April.

★ Lead is becoming a steadily increasing product of Silbak Premier Mines, Ltd., Portland Canal mining division. For the first four months of 1948, production was 4,717 oz. gold, 34,027 oz. silver, and 981,850 lb. lead from 26,680 tons. Satisfactory progress is reported on the installation of a zinc circuit to recover the zinc content of the ore.

★ Halport Mines, Ltd. has established a camp and has 12 men at work on its Unuk River property, situated between Stewart, B. C., and Ketchikan, Alaska. Supplies and equipment including a diamond drill have been dropped to the party from planes. Drilling is under the supervision of Al Seraphim. The company is financed by Karl J. Springer and associates.

★ Big Four Silver Mines, Ltd. has resumed the exploration program commenced last year on the Prosperity and Porter Idaho properties, Portland Canal mining division. A party has established camp near the summit of Mount Rainey and is again being serviced by plane, which drops supplies and equipment. To obtain the maximum benefit of the short season, a 50-h.p. compressor has been installed and 500 ft. of pipe laid to one of the showings on the Tessaro vein on which trench assays last fall indicated 1,960 oz. silver and 59% lead per ton across 8 in., with an adjoining 16 in. assaying 418 oz. silver and 15% lead. The work is under the supervision of A. Bagnalo.

★ Important replacement ore has been encountered by the Cariboo Gold Quartz Mining Co., Ltd. on the "Les Walker" vein on the 1,300 level. The occurrence has been traced for 150 ft. on the plunge with an average width of 7½ ft. Dr. W. B. Burnett, president, states the body contains a band of pure sulphides 30 in. in width with assays running from 2 to 3 oz. per ton. The main shaft has been enlarged to accommodate 3 full compartments to the 2,000 level and will open previously developed ore for mining.

★ To protect the water supply for the Allenby concentrator and townsite of the Granby Consolidated Mining, Smelting and Power Co., Ltd., Similkameen mining division, Atkinson Dredging Co., Ltd. proposes to dredge an old channel on the west side of the Similkameen River, then construct a dike and divert the stream into the freshly dredged section. Excavation of a lagoon and installation of a filter are expected to provide a satisfactory supply of clear water.

Upstream from Allenby, S. K. Atkinson, Sr., president of the dredging company, estimates reserves of 9 million cu. yd. grading 40c. per cu. yd. in gold and platinum, a supply sufficient for 9 years' operation at the present rate. The company also holds extensive placer ground in the State of Idaho.

★ Milling was resumed June 4 by Hedley Mascot Gold Mines, Ltd. and Kelowna Exploration Co., Ltd., after a brief suspension. Serious floods, prevalent all over British Columbia, broke the waterpipe from Twentymile Creek and destroyed sections of the power line. Many men from the Sullivan mine and mill at Kimberley had to be transferred to fight floods from Mark Creek, which inundated a large section of the city.

★ Nighthawk Gold Mines, Ltd. has been incorporated as a subsidiary of Hedley Mascot Gold Mines, Ltd. to acquire and develop the Good Hope and Nighthawk group of mineral claims on Nickel Plate mountain, 2½ miles from the Mascot property, and the Horsefly claim, situated within one-half mile of the tram bunkers.

★ Concrete is being poured for the 1,000-ton mill of Reeves MacDonald Mines, Ltd., subsidiary of Pend Oreille Mines and Metal Co., near the international border in the Nelson mining division.

★ Since the resumption of operation, Alpine Mining Co. has recovered gold

valued at approximately $25,000 from its property near Nelson. John B. White, president, states operating difficulties encountered during the winter have been overcome and, it is expected, regular shipments of concentrate will henceforth go forward to the Trail smelter.

★ Violamac Mines, Ltd., a Toronto company, has purchased the Victor mine, Slocan mining division, and will initiate shipments of high-grade gold-silver-lead-zinc ore to the Trail smelter in the near future. The company has also acquired the Lone Batchelor mine and a development program is being formulated. The Violamac company is headed by Mrs. Viola MacMillan, president of the Prospectors and Developers Association.

★ Silver Giant Mines, Ltd., has resumed shipment of high-grade lead-silver ore from the dump at its property at Spillimacheen, Golden mining division. Underground faces are being prepared to assure future supply when the dump ore is exhausted. The company recently purchased the complete mining plant of Dawson Consolidated Gold Mines, Ltd., former operator in the New Westminster mining division.

YUKON

★ Yukon Explorations, Ltd., partly-owned subsidiary of Transcontinental Resources, Ltd., has commenced hydraulic stripping on its placer ground on the Sixtymile River, in preparation for dredging expected to follow within two weeks. First production was obtained late in 1947, when the company's large bucketline dredge was commissioned.

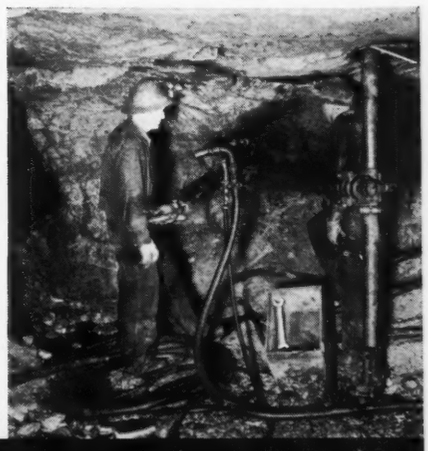
★ According to a prospector at the Firth River placer deposit, gravel benches extend for 20 miles up river and it is the gold found in these benches which caused the present rush. The benches vary in depth from 10 to 30 ft. Most of the bars on the west side between the cabin (the only building in the area) and Joe Creek, which is some 30 miles up river, were tested and gold was found in every bar. No colors were found, however, further upstream than the confluence of the Firth River and Joe Creek. Two prospectors reportedly spent the summer of 1946 in the headwaters of the Firth River but found no placer of any kind in that area.

MEXICO

French-owned companies join Mexican to develop silver-copper—Farmers claim mining damages

★ Mining is generally more optimistic with the settlement of most of the strikes of March and April, after labor won wage increases of 14 to 20%

Cut Drilling Costs 3 Ways WITH



"MINE KING"
"Standard of Quality" AIR HOSE

A leader in the Goodall line . . . backed by 78 years of hose-building experience . . . made to specifications that assure important savings in hose and operating costs.

Molded and Braided Construction
Sizes ½", ¾" and 1"

Save on Hose Replacements . . .

"Mine King's" tough, resilient cover withstands severest abrasive wear and acts as a shock absorber against falling rock, timbers, tools, etc. Also protects duck carcass from absorption of sulphurous mine water.

Save on Coupling Costs . . .

"Mine King" is available in *extra long lengths*, requiring fewer intermediate connections.

Save Time and Trouble in Handling . . .

"Mine King's" extreme flexibility facilitates drilling operations in "tight" spots, and coiling for transport.

Contact Our Nearest Branch for Details and Prices.

GOODALL RUBBER CO., INC.
THE GOODALL-WHITEHEAD COMPANIES
MILLS and EXPORT DIVISION, TRENTON, N. J.—ESTABLISHED 1870
Branches: Philadelphia • New York • Boston • Pittsburgh • Chicago • St. Paul • Los Angeles
San Francisco • Seattle • Salt Lake City • Houston • Distributors in Other Principal Cities

Investigate this MODERN Core-Drilling Machine

It's Engineered to Meet Your Most Severe Demands

Sprague & Henwood Core Drilling Machines are modern in every respect . . . can EASILY perform the work expected of them! That's because they are built to meet the demands of present day core drilling work! The machines are high speed, exceptionally sturdy constructed to withstand rugged service. Available with two distinct types of feeds, "Screwed" and "Hydraulic," according to the types of swivel head selected. Have many exclusive features. Write today for full details.

Bortz DIAMOND BITS are also manufactured by Sprague & Henwood. Full details sent upon request.

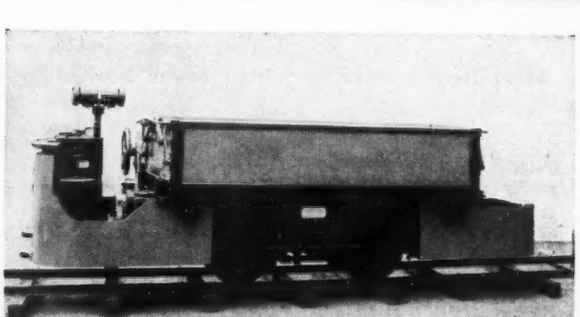
SPRAGUE & HENWOOD, Inc.

Dept. K **Scranton, Pa., U. S. A.**

Backed by 25 Years Experience with Storage Battery Locomotives

THE GREENSBURG "CRUISER"

Operators say—"20% MORE EFFICIENT than average Storage Battery Locomotives"



All Locomotives CUSTOM-BUILT to your requirements

FEATURES

- 2-motor drive; total 24 h.p.
- Series parallel controller.
- Extra long journal springs for better trackability, roadability.
- Oil-tight, leakproof transmission. Use auto oil, renew once every 6 months.
- Adjustable Timken Roller Bearings throughout.
- Strong, Simple construction. Low maintenance cost.

MORE HAULING FOR LESS STORAGE BATTERY CAPACITY

GREENSBURG MACHINE CO.

Makers of Custom Built Storage Battery Locomotives

102 STANTON ST., GREENSBURG, PA.

MEXICO (*Continued*)

and other economic benefits. There are indications of some tax relief for business and prospects of an increase in exports, principally of lead, copper and zinc, stemming from defense preparedness in the U. S. and postwar reconstruction in many countries.

★ Businessmen and bankers of Perote, Vera Cruz, are reported to be organizing a company to work gold, silver and aluminum deposits recently discovered between Actopan and Coacoatzintla in the Perote zone.

★ Four groups of geologists, headed by Jenaro Gonzales Reyna, have been sent by the Mexican Geological Institute to various parts of Oaxaca seeking ore deposits, with a view to increasing the national mineral reserves.

★ Financing of prospectors to enable them to continue and intensify their work is being considered by the permanent committee chosen at a recent convention of miners and Government officials under the Mexican Mining Association. The plan calls for providing grubstakes for the prospectors in the form of Federal Government cash credits.

★ Two French-owned mining companies, the Cia. Minera del Boleo, S.A., Santa Rosalia, Baja California, for 50 years a big copper producer, and the Cia. Minera Dos Estrellas, S.A., Mexico City, have joined forces to work with Ernesto Rios, Mexico City, in the development of reportedly high grade silver-copper properties at Pichucalso, Chiapas. A road 28 miles long is being completed to the railhead that runs to ports on the Gulf of Mexico, and a crew of 300 men are now working at the mines. Rios expects exports, chiefly to the U. S., of silver concentrates and copper to start about the end of June.

★ Altos Hornos de Mexico, S.A., Monclova, Coahuila, a large iron and steel works with headquarters in Mexico City, is to spend 42 million pesos ($8,275,000) in 1949 to expand and improve, featuring installation of coke ovens, a chilled steel plant and an electricity generating plant, announced Ing. Jose Carrillo, company technical director.

★ Search for iron and coal deposits is being made in Michoacan and Pacific coastal Guerrero by geologists of the industrial investigations department of the Bank of Mexico, as part of the Bank's contribution to the national program to advance industry and provide raw materials reserves for it.

★ Farmers in various mining zones have complained to the Mexican Government that some mining companies are "contributing to deforestation" by inordinately felling trees to timber their undersurface workings. The Ministry of Agriculture is investigating.

★ Mazapil Copper, Concepcion del Oro, Zacatecas, has been allowed by

the Mexican Supreme Court to continue underground works which farmers of the area sought to stop by injunction, asserting that the operations damaged their property. The court, however, ordered the company to compensate the farmers for the damage claimed.

CHILE

Caja de Credito Minero pays 103 pesos per gramme of gold—Ore thefts at Atacama increase

★ In a report to the press, the Secretary of the Treasury has announced the arrangements arrived at between the Chilean Government and Anaconda Copper Mining Co. under which the latter will start building at the Chuquicamata mine the first 12,000-ton section of its 60,000-ton flotation mill and the smelter. After stating that discussions had taken more than a year, the Minister said that when construction is finished more than $130 million will have been spent. The company will be able to use the banking rate of exchange prevailing at the time (today it is at the rate of 43 pesos to the dollar) to turn dollars into pesos, in order to pay for labor, supplies, freight, and even import duties on machinery steel and building materials, instead of getting 19.37 pesos to the dollar, which is the current rate of exchange for all dollars required for production. A 7% deduction will be allowed from profits before payment of the tax on real estate, and 10% will also be allowed as amortization on all new machinery and equipment required for the new plant. For current investments, there will not be any changes in amortization rates. In any case, amortization cannot exceed 1.625c. per lb. of copper produced in both the old and the new plant.

The company will undertake to build a minimum of 100 new houses per year for employees and workers; to collaborate and help the Chilean Government to fulfill any obligations derived from any trade treaties Chile may sign with foreign countries, though the company will preserve its right to sell directly such copper to satisfy trade treaties.

Of the total amount of $130 million, Chile Exploration Co. will spend $60 million during the first 4 years and of this sum about 40% will be spent in the country. Production will be increased from 430 million lb. to 540 million lb. of copper per year. This increase in production will lower costs. A labor force of 1,500 men will be employed in construction.

The Minister ended his announcement by stating that he hoped that this satisfactory deal might mark the beginning of a period of important foreign investments in Chile.

"We saved 96 man hours when we installed U·S·S LORAIN ROLLED PLATE LININGS"

So reports a mill using U·S·S Lorain Rolled Plate Linings. But the savings in installation time they afford are but one reason for the popularity of these plate linings. They actually *stay in longer*. And—because they have high abrasion-resisting qualities, have plate and lift bars that are reversible and lift bars that are renewable at partial lining costs—*they help cut maintenance costs.*

The exceptional strength and toughness of U·S·S Lorain Plate Linings enable the use of thinner plates, thus increasing mill diameter and output.

This superior plate lining is available in the diameter, length and thickness best suited to your operating conditions. It will produce better results, more economically, no matter what you grind. For specific answers to your grinding problems, we shall be glad to supply the names of grinding mill manufacturers who distribute U·S·S Lorain Plate Linings.

U·S·S LORAIN GRINDING BALLS

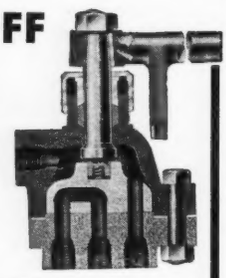
—forged from new steel, they are accurately heat-treated to obtain hardness of maximum penetration combined with toughness to resist breakage. Standard sizes are available from ¾" to 5" in diameter.

USS STEEL UNITED STATES STEEL

CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
8-156

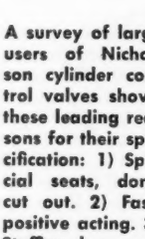
UNITED STATES STEEL

STANDARDIZING
on Nicholson Valves
PAYS OFF



Style E for air, gas, oil, steam, water; press. to 500 lbs.

A survey of large users of Nicholson cylinder control valves shows these leading reasons for their specification: 1) Special seats, don't cut out. 2) Fast, positive acting. 3) Stuffing box easily repacked. 4) heavy - bodied, take abuse. 5) Neat, installed in any position. Nicholson control valves are furnished for all mediums and types of operation—lever, foot, solenoid and motor. Choice of 6 metal combinations to meet specific needs. Pressures to 5000 lbs.



Style H, pressure to 5000 lbs.

Catalog 546

W. H. NICHOLSON & CO.

201 Oregon St., Wilkes-Barre, Pa.

CHAMPION
◆ DIAMOND ◆
CORE BITS
LAST LONGER

CASING BITS — CORE BITS — REAMER SHELLS

THREE TYPES:—
BRONZE MATRIX COREBIT for solid rock and softer formations.
NICKEL MATRIX COREBIT for drilling difficult formations.
TUNGSTEN MATRIX COREBIT for extremely hard or broken formations too tough for any other type.

We also make
DIAMOND CASING BITS
and **REAMER SHELLS**
with "Champion" Diamond Inserts,
1" long, 3/8" wide, 3/32" thick

In three types — Longyear, Sullivan and Sprague & Henwood, single or double tube. CHAMPION DIAMOND INSERTS brazed in your special shells, or available unattached for your own brazing.

SEND FOR THE CHAMPION DIAMOND CATALOG AND PRICES.

CHAMPION DIAMOND CO. INC.
551 Fifth Avenue
NEW YORK 17, N. Y.
Cable Address — WILLARTZ NEW YORK

Chile *(Continued)*

★ The miners at Atacama Province are becoming increasingly alarmed at frequent theft of ores, especially gold ores, at the mines. The value of high grade cyaniding gold ores has risen sharply with the present value of gold coins in the country.

★ In spite of several long strikes, 1,631,223 tons of sodium nitrate were produced in 1947 and 1,666 metric tons exported, this figure being greater than that of 1946 by 252,000 tons. Bar copper produced in 1947 was only 408,400 metric tons against 358,603 tons in 1946. Production of copper for both years was low due to strikes, Chile having produced 450,000 metric tons of copper during the war years. Iron ore exported in 1947 reached 1,737,000, an increase of more than half a million tons above 1946.

★ Cia. Minera Tocopilla is again producing at its former level of 600 metric tons of 27% concentrates a month. The concentrates carry also about 0.17 oz. of gold per ton.

★ Caja de Credito Minero is now paying the miners in Andacollo 103 pesos per gramme of gold, which is equivalent to $103 per oz. at the exchange rate of 31 pesos to the dollar.

BRAZIL

Large diamond found at Catalão—Apiai smelter reopens, Panelas is enlarged

★ A white clear 200 karat diamond of remarkable beauty was found recently at the diamond placers near Catalão, State of Goiás. This is the largest gem ever found at Catalão. The region is not far from the famous Western Minas Gerais diamond-bearing areas that in the last six years have produced the "Presidente Vargas," world's fourth biggest diamond, and "Governador Valladares."

★ Industria e Comercio de Minerios Ltda., a concern of Belo Horizonte, Minas Gerais, signed a contract with the Government of the Territory to continue prospecting iron ore deposits discovered at the Amapari River Territory of Amapa, which the M. A. Hanna Corp. prospected several years ago and later dropped. Substantial reserves of high-grade manganese ores are also reported near the iron mines.

★ A new plant at Recife, State of Pernambuco, is to start producing fertilizers, using high grade spatite from Sumié, Monteiro County, State of Paraiba. The ore is trucked for 40 miles and transferred to railroad cars for a distance of 200 miles to reach the plant. The plant is owned by Empresa de Produtos Quimicos e Fertilizantes Ltda., and managed by Prof. F. P. U. Rosso, of the School of Chemistry of Recife.

★ New occurrences of gypsum were recently discovered at the western slope of the Itabaiana plateau, Araipina and Ouricuri Counties, State of Pernambuco. Gypsum beds 30 ft. thick are found at the bottom of the Araripe series, of Cretaceous age, and are covered by weathered sandstone strata. Mr. Domingos Campos is prospecting the new mines and intends to ship the ore to the Itáu and Belo Horizonte cement plants of the Companhia de Cimento Portland Itáu.

★ As a result of the prevailing high prices for lead, the Panelas smelter of Plumbum SA at Bocaiuva, State of Paraná, is being enlarged and a new blast furnace is under consideration. The company mines the ore, which is rich enough (30% Pb) to afford direct smelting, and no milling is required.

★ The Government of the State of São Paulo has announced that the Apiai lead smelter, idle since the end of 1942, will resume operation shortly. At São Rafael mine, Iporanga County, State of São Paulo, high grade ores were recently reported and shipment was made of 100 tons of 55% grade ore to the Apiai smelter. Several small outcrops are under prospecting and some of them might turn out substantial tonnages of ore to meet the smelter capacity.

★ Lithium bearing micas were recently reported in a thick pegmatite vein at Perus, near São Paulo, by Prof. R. R. Franco, of the University of São Paulo. Discovery was made by Dr. Knecht, a São Paulo geologist, while studying the large pegmatite dikes that cut through the Pirituba granites, of pre-Cambrian age.

AUSTRALIA

Gold production decreases throughout the Commonwealth—Zinc Corp. to double mine output

★ In January, 1948, gold production in the Commonwealth was 68,776 fine oz., compared with 77,195 fine oz. in January, 1947. In the same month, however, New South Wales production of 3,938 fine oz. represented an increase over the preceding January. Output of Victoria for 1947 was 84,709 fine oz., or 2,284 fine oz. less than in 1946. Shortage of labor is the chief factor preventing the industry from returning to a state of comparable importance. The Government of Victoria regards the position seriously, and it is possible that moves will be made toward a subsidy to producers, or an increase in the price of gold.

★ The export of tantalite has been brought under Commonwealth Government control and an export licensing

scheme introduced to prevent the exportation of tantalite and the metal, tantalum, to undesirable destinations. During the war Australia was almost stripped of tantalite stocks for war purposes. The total Australian production to 1944 was 294 tons, valued at £A150,000. In 1945, production was 6 tons, and about one-third ton was produced in 1946; figures for 1947 are not available, but the output was not high.

NEW SOUTH WALES

★ Zinc Corporation, Ltd., Broken Hill, plans to double the mine output of lead and zinc concentrate; present production is at the rate of 450,000 tons of ore per annum. The cost of the work involved is estimated at £A10 million. In addition to planning for increased output from its own mine, the corporation must make provision for treatment of the ore from the adjoining New Broken Hill Consolidated mine, which is under its management, the agreement between the two companies providing for the treatment of ore at the one mill. The Zinc Corporation main shaft is now used for the hoisting of ore from the New Broken Hill Consolidated mine, but a new main hauling shaft is being sunk at New Broken Hill.

★ Lead and silver contents in lead concentrate, and zinc in zinc concentrate, produced by Broken Hill South, Ltd. during the financial year ended May 1 showed a decline from figures for the corresponding period of 1946-47. Lead dropped from 29,405 tons to 24,127 tons, silver from 1,481,602 oz. to 1,377,732 oz. and zinc from 21,952 to 22,262 tons.

★ At North Broken Hill, Ltd. lead in lead concentrate dropped from 39,762 tons to 31,255 tons, silver from 2,017,786 oz. to 1,467,028 oz. and zinc in zinc concentrates from 29,178 tons to 22,741 tons.

WESTERN AUSTRALIA

★ As in the Commonwealth, shortage of labor coupled with reduced working hours since Jan. 1 is causing serious hold-up on the state's gold production. Employment of workers at overtime penalty rates, which is now common in manufacturing industries, is ruled out by the marginal cost structure of most gold mines. Mint returns for the first quarter of 1948 were 15% lower than those of the first quarter in 1947.

★ After five months of operations, Meekatharra Sands Treatment & Mining, N.L. is recovering 0.9 dwt. of gold from each ton of sand. The sands which the company is treating are located about 1½ miles from Meekatharra. It is estimated that 600,000 tons is available for treatment, by flotation and agitation. The sands are pulped at the dump with barren solution and pumped to the agitators.

It's **NAYLOR** *Light-weight* **PIPE**

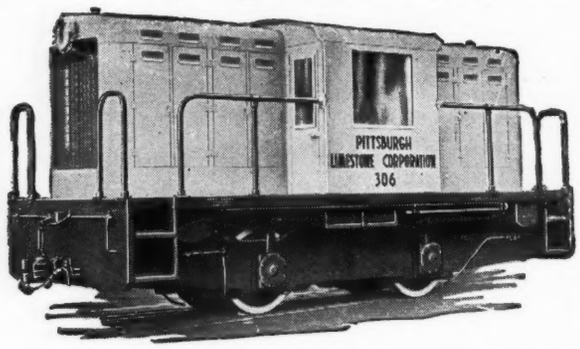
Here's the one light-weight pipe built to handle both high and low pressure jobs in mining service. The exclusive Lockseam Spiralweld creates a reinforcing truss that increases collapse strength and thus makes Naylor stronger and safer than ordinary light-weight pipe. That's why mine operators prefer Naylor for permanent as well as temporary lines. Sizes from 4 to 30 inches in diameter.

Coupled with* NAYLOR *Wedge-Lock Couplings

Another NAYLOR contribution is the Wedge-Lock Coupling—the last word in speed, simplicity and economy of pipe connection. Built in one piece with gasket in place, it can be quickly and easily connected or disconnected by means of a hammer. Two types—for high or low pressure service.

NAYLOR PIPE COMPANY
1243 East 92nd Street, Chicago 19, Illinois
New York Office
350 Madison Avenue, New York 17, N.Y.

Winning RESPECT Through PERFORMANCE



DAVENPORT LOCOMOTIVES — Speed and Power the World Over

Better-Built
DAVENPORTS
are AVAILABLE in
STEAM
GASOLINE
DIESEL
with
ELECTRIC
or
MECHANICAL
DRIVE

You, too, will find in Davenport Better-Built Locomotives the complete solution to your haulage problems. Built to serve through extra years of efficient and dependable operation, Davenports make a direct contribution to operating profits through lowest ton-mile haulage costs.

WE ANALYZE YOUR NEEDS

It will be a pleasure to send you our latest Haulage Survey Data Sheet to enable you to describe your haulage conditions accurately and completely. Our engineers will analyze the data you submit and recommend the power unit that will perform most profitably for you.

Write Us Today

EXPORT OFFICE **BROWN AND SITES CO., INCORPORATED**
50 Church St., New York — Cable Address "Brosites"

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

Tendremos mucho gusto en envarle un catalogo en Espanol describiendo las Locomotoras Davenport.

Acceptance plus...

FARRIS PINCH VALVES

Based on performances like these!

- **Installed 1939. Opens and closes every 2 minutes—7 hours a day. Still going strong.**
- **Acid content ruined metal valve. Pinch Valve installed 1933—no maintenance—no sign of wear.**
- **Installed 1936. Conveys 40% sand, 60% water, 2000 gals. per 7-hour day.**
- **Iron Valves lasted 3-4 weeks. Pinch Valve installed 1933—over 57,000 hours operation—no sign of wear.**
- **Pinch Valves show 11-to-1 life over cast iron—no sign wearing out—"give promise of lasting indefinitely."**

In controlling the flow of many highly ABRASIVE and CORROSIVE materials—and for general severe service conditions—these performance records of FARRIS PINCH VALVES are not unusual. Construction permits opening and closing, rapidly, or at long intervals, with endless flexing, without fatigue or breakdown, even under most grueling performance requirements. Available in hand and automatic types, including relief valves.

WRITE FOR new Bulletin No. 70

Farris

FARRIS ENGINEERING CORP.
418 Commercial Ave.
Palisades Park, N. J.

1769

SAFETY and RELIEF VALVES

FARRIS keeps pace with advancing power and process engineering

Australia *(Continued)*

They are then filtered and the tailings are discarded to a new residue dam. About 7,000 tons came through the mill in the last 4-weeks period reported on, but 9,000 to 10,000 tons for a like period is expected to be attained shortly.

TASMANIA

★ Zinc production at the Risdon electrolytic refinery is running 6,200 to 6,500 tons a month, which is a substantial gain over last year's and prewar output figures. Production still falls short of 1945-46 records. This is chiefly because of the unsatisfactory shipping conditions between Tasmania and the mainland which continue to hold up supplies of concentrates.

PHILIPPINES

Taysan Mining Co. will resume at Antipolo mine—War damage claims to be paid

★ Stockholders of East Mindanao Mining Co. have ratified an operating and profit-sharing agreement with the Philippines American Corp. under which the latter will investigate the ore possibilities of the mine by drilling, prospecting and development work, at a cost of not less than £25,000 to be furnished by the corporation. East Mindanao was an important prewar gold producer but lost its entire surface equipment, mill, and power plant in the bombing that followed the occupation. The Philippine American Corporation has already expended large sums in acquiring mineral land within the Surigao area in which the mine is located and is conducting exploration and development work on the Wichman property, about 3 miles west of East Mindanao land.

★ Taysan Mining Co., operating the old Antipolo mine under Soriano management, has been shut down for some time because of labor difficulties. An agreement was reached to resume operations on June 1 on a basis entirely satisfactory to the operators. Prior to the shutdown the mine was producing about $40,000 per month in gold from milling about 2,000 tons, with an operating profit of $15,000 monthly.

★ Acoje Mining Co., an important prewar producer of metallurgical grade chromite ore, is doing a limited amount of development work, rebuilding its pier, and repairing the road to get it into shape for truck haulage. First shipments of ore to the United States will be made in August.

★ Substantial and immediate payment of 30% of approved amounts on war damage claims in excess of $500

has been announced by the U. S. Philippine War Damage Commission following a preliminary analysis of more than 1,258,000 claims submitted. After a final analysis the total amount paid on all approved claims may approximate 40% of their approved value. This may speed up rehabilitation of important prewar gold mines in the Paracale and Masbate fields, which have been lying idle until funds were made available.

INDIA

Bihar would vest title to mining rights in Provincial Government—North Indian salt deposit promising

★ The Province of Bihar, home of India's mica industry, a major portion of the coal industry, a sizeable iron ore industry and a fireclay mining operation, is enacting legislation which will vest title to all mining rights in the Provincial Government. Providing a sliding scale of reimbursement which levels off at a major payment of only 3 times the annual income from the property in question, the legislation has passed the legislature and awaits the signature of the Provincial Governor. The provincial policy cuts across the Central Government's intention to ultimately make all mineral properties Government-owned, but until a new constitution is enacted the legal position is unclear.

★ Intensive exploration for salt deposits is being carried on in India, spurred by the fact that partition placed the vast Khewra salt workings in the dominion of Pakistan and left Northern India without a convenient source of supply. Most promising North Indian deposit appears to be in Mandi State where surveys show a deposit some 40 miles long, ranging up to a quarter-mile wide and 100 ft. thick. Purity ranges between 75 and 80%, with some quartzite, sandstone, lime, etc. There is a heavy overburden of limestone and traprock, and hydraulic pumping of brine is believed by experts to be the best method of exploiting the body.

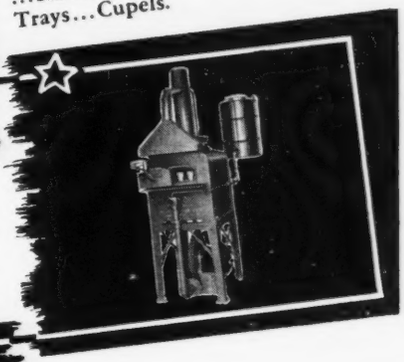
SOUTH AFRICA

Continued progress reported in development of St. Helena—Large capital expenditures at Premier and Consolidated companies

★ The intention of the Southern Rhodesian Government to pay a subsidy of 27s. 6d. an oz. on all gold produced in the Colony is important, if only from

A WINNING Combination
FOR DEPENDABLE AND EASIER... ASSAYING

METALLURGICAL CLAY GOODS
Made to withstand the usage to which they are subjected, highly resistant to thermal shock. Crucibles...Muffles...Annealing Cups ...Roasting Dishes...Scorifiers... Trays...Cupels.



GAS, OIL AND ELECTRIC ASSAY FURNACES—Built to give you top efficiency for all assay heating processes. DFC Assay Furnaces are roomy and offer optimum operater comfort. No wonder they are used throughout the world.

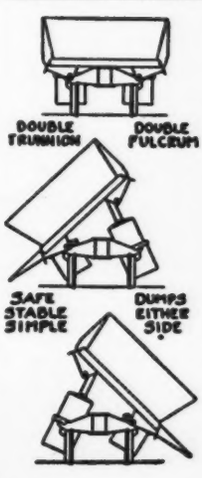
The DENVER FIRE CLAY Company
EL PASO, TEXAS · NEW YORK, N. Y. · DFC · SALT LAKE CITY, UTAH
DENVER, COLO., U. S. A.

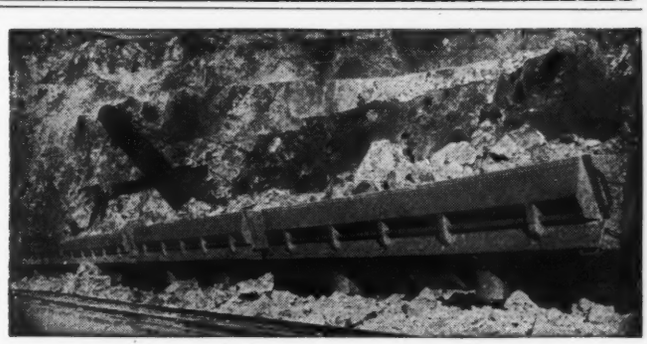
WRITE FOR... COMPLETE INFORMATION

METALS — ORES — CHEMICALS
FERRO-ALLOYS · METALLIC BY-PRODUCTS · SCRAP
OVER THIRTY YEARS SERVICE TO THE MINING INDUSTRY IN THE MARKETING OF ORES.

Phibro

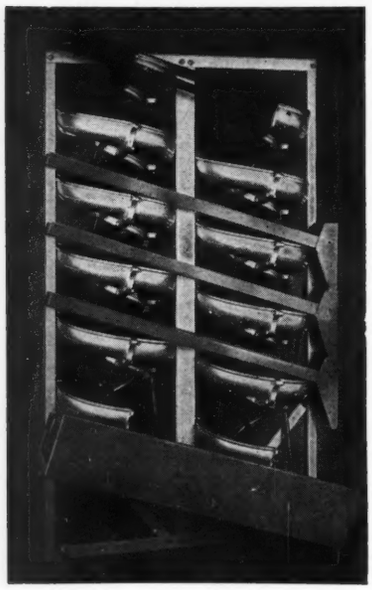
PHILIPP BROTHERS, Inc.
70 PINE STREET, NEW YORK 5, N. Y.
Cables: Phibro New York





DIFFERENTIAL AIR DUMP CARS ● MINE CARS ● LOCOMOTIVES ● ROCK LARRIES ● HAULAGE SYSTEMS
DIFFERENTIAL STEEL CAR CO. FINDLAY, OHIO

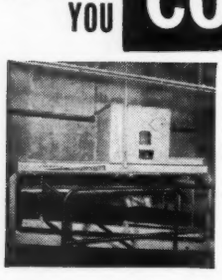
HUMPHREYS
SPIRAL CONCENTRATOR



LOW COST OF INSTALLATION
NO MOVING PARTS
LOW OPERATING COST

Engineering Division
The Humphreys Investment Co.
First National Bank Building
DENVER 2, COLORADO

WEIGH WITHOUT STOPPING
WHILE YOU CONVEY



Yes, weigh and record with the —MERRICK

WEIGHTOMETER

The Merrick Weightometer provides a continuous, automatic, accurate weight record at any designed point in the mill, while material is in motion on conveyor. It weighs without interrupting conveyor service.

Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

MERRICK SCALE MFG. CO. PASSAIC N. J.

South Africa *(Continued)*

the standpoint that Rhodesia, following Canada, is the second country to take unilateral action to assist gold production. The effect of the Rhodesian subsidy will be to give producers a price of £10 an oz. for their gold. Southern Rhodesian output is about 500,000 oz. a year, so that the total value of the subsidy is approximately £750,000.

★ No. 1 shaft on Western Holdings will be sunk to a depth of about 5,300 ft. Concreting of the shaft collar is in progress, and the foundations for the hoist and other shaft-head equipment are being laid.

★ At the St. Helena, last quarter, the No. 3 incline shaft was sunk 743 ft. to a depth of 2,161 ft. from surface. Three routine boreholes put down from this shaft show that the Leader and Basal Reef horizons occur about 60 ft. and 90 ft. respectively below the incline. No. 4 vertical shaft was continued to a depth of 432 ft. from surface. Construction of the plant and other buildings continues. It was expected that an electric power supply will be available on the property almost immediately. The railway line has been constructed as far as Odendaalsrust and is partially open to traffic.

★ At the West Rand Investment Trust meeting the chairman said that drilling in the Western Ultra Deep Levels area had confirmed the existence of the Carbon Leader at workable depths. The question of applying for a mining lease was considered and it was hoped to proceed with the matter during the current year.

★ Consolidated Murchison reported ore reserves at December 1, 1947, of 128,000 tons deemed payable on account of gold and antimony combined, and a tonnage of 47,000 with average value of 5.3 dwt. per ton payable on account of gold content only. Development footage and ore reserves previously have been calculated with respect to gold content only. But now that a degree of continuity has been established in regard to sales of antimony, calculations take into consideration the combined gold and antimony content of ore.

★ Not less than 7 years will be required to complete the £3 million program at E.R.P.M. to explore and exploit claims toward the southern boundary of the central and southeastern sections of the mine. The values disclosed in the lower levels of the central and southeastern sections seemed to justify plans for development in depth of the large unexplored claim areas towards the southern boundaries of these sections.

Plans were completed last year for the sinking of a sub-vertical shaft in the central section, near the central vertical shaft, to extend from 41st level to the 58th level at the 8,000-ft. horizon. It was decided also to sink a vertical shaft in the southeastern portion of the mining area from the surface to the 43rd level, a depth of approximately 6,000 ft., to be followed in due course by the sinking of the sub-vertical shaft to the 58th level at the 8,000-ft. horizon.

★ Anglo-American Corp. of South Africa, Ltd. and Murex, Ltd. of England are financing a company, Hard Metals, Ltd., to manufacture tungsten carbide bits at a factory at Vandebijl, near Vereeniging.

The company is to consist of a hard metals section and a bit-making plant with all the necessary accessories. The capital of Hard Metals will be increased from £5,000 to £400,000 to finance the project and take over the plant and equipment of Coventry Garage and Brooke Tool (S.A.) (Pty.), Ltd. South African mining groups also will participate. When the company was formed Anglo-American had 70% interest and Murex the rest.

★ The report of the Premier (Transvaal) Diamond Mining Co. for 1947 shows that a sum of £537,460 was expended during the year on the work of re-equipping the mine for production, the total expenditure now amounting to £1,093,398. Production from the pilot plant commenced in August, and by the end of the year a total of 81,361 loads were treated, yielding 14,018 carats. The No. 1 vertical shaft was completed in August, and work is now being carried out in developing the 1,065-ft. level to the rim of the pipe, a distance of 1,000 ft. Work on the sinking of No. 1 sub-vertical shaft from the 610-ft. level was started in October.

After numerous difficulties, installation of the heavy media "sink and float" concentration plant was completed. At the year-end the plant was handling 95-100 loads per hour. From results obtained it is believed that this type of plant is a considerable advance in the method of treating blue ground. Further experiments were carried out for the first 3 months of 1948 before work on the final plant was begun. While the full scale plant is being erected, the pilot plant will be operated on 3 shifts per day.

★Under the supervision of a full-time geologist exhaustive prospecting is being carried out at Elizabeth Bay and Bogenfels, according to the annual report of Consolidated Diamond Mines of Southwest Africa. An extensive scheme of mechanization is in progress at Orange Mouth. All screens and jigs are being operated electrically, and all transport in the workings is by either diesel or electric locomotive. A tower scraper is on order at a cost of $80,000, which is expected to facilitate the removal of overburden. To work out small payable areas in the Northern Areas efficiently, and also to speed up prospecting in general, two entirely self-contained mobile units have been designed and ordered. Capital expenditure for 1947 was £146,394.

(*Continued from Page 105*)

Mine Safety Trophies Awarded by Magazine

According to U. S. Bureau of Mines, *The Explosives Engineer* has awarded its Sentinels of Safety trophies for 1947, signifying outstanding safety achievements during the year. Among the winners were:

Mahoning iron ore mine of Pickands, Mather & Co., at Hibbing, Minn., for working 365,157 man-hours without a lost-time accident.

Soudan iron ore mine of Oliver Iron Mining Co., at Soudan, Minn., for working 527,595 man-hours without a lost-time accident.

No. 5 Limestone mine of the Tennessee Coal, Iron and R.R. Co., Bessemer, Ala., for working 314,310 man-hours without a lost-time accident.

The Dolonah dolomite quarry, of Tennessee Coal, Iron and R.R. Co., Bessemer, Ala., for working 297,246 man-hours without a lost-time accident.

Mining Is Third Highest In Injury Frequency

Figures for 1947 released last month by the National Safety Council show a 10% reduction since the previous year in accident frequency rate, based on 41 industries. Though showing some improvement over 1948, mining—exclusive of coal—again ranked third from lowest in safety, coal mining second lowest, with lumbering causing the greatest number of injuries per man-hour worked. With regard to severity of accident, however, coal mining suffered the greatest loss of time, other mining second, and lumbering third.

Some significant figures are shown below:

Industry	Frequency (Disabling injuries per 1 million man-hours)	Severity (Days lost per 1,000 man-hours)
Communications	2.98	.16
ALL INDUSTRIES (av.)	13.26	1.23
Quarry	17.05	3.69
Mining, other than coal	50.54	6.17
Mining, coal	54.46	7.96
Lumbering	59.74	5.24

MMSW Locals Still Defy Communist Heads

After attending a national wage conference held in Denver May 29-30, allegedly "packed with stooges" of the international officers, Utah representatives of IUMMSW continued to fight Communist domination of the union. At a meeting on June 6, they voted to recommend withdrawal of local unions from MMSW as the only way to retain contracts without striking, following ultimatum of employers that non-Communist affidavits must be signed by union officers if negotiations were to be continued. C. F. Kelly, president of the Garfield, Utah, Smeltermen's union said the Utah locals would stick together and "write some of their own terms before becoming affiliated with any other union such as PMC or UAW."

Midvale Smeltermen's local at a referendum June 7 voted to leave the international, and Clerical and Technical Workers' local, Magna and Arthur, followed suit on June 8. The only possible source of strength left to MMSW was among Kennecott Copper Corp. employees, and these were expected to go along after all other locals had left the international.

John Clark, international president, who had been ousted from the June 6 meeting, announced suspension of Wesley J. Madill, Garfield, as western vice president of MMSW, on June 10, the same day Mr. Madill's home union voted to conduct the referendum vote on withdrawal from the international. Clark said Madill had led a secessionist movement after failing to carry his position in Denver. Madill and Ken Eckert, national chairman of the union's die casting division, had urged signing of non-Communist affidavits by MMSW officials.

Meanwhile, in Canada, another representative of IUMMSW, U. S.-born Rudy Hanson, was ordered deported to the United States. He was arrested on orders of the Dominion Immigration Department, but police officials refused to disclose the charges. Other members of the same union deported recently by the Canadian Government in an effort to rid the country of aliens accused of Communist sympathies were Reid Robinson, eastern vice president of IUMMSW, and George Knott, union official and organizer.

Dismissing Non-Union Man Presents Complications

Under Taft-Hartley employers must use greatest care when firing any employee under a compulsory union membership contract, as the law requires employers to examine the reason for an employee's ejection from a union before firing him for non-membership in the union.

A case in point is the Idarado Mining Co., which had had a "maintenance of union membership" contract with Mine Production Workers, AFL, since 1944, covering production and maintenance workers in its Treasury Tunnel at Ouray, Colo. An employee, Charles Miller, electrician, quit his job in Nov. 1944 while a member of the union, returning a year later to take a job as watchman. He did not restore membership in Mine Production Workers but instead became active in a drive of UMW, District 50, to replace MPW as bargaining agent. On demand of MPW, the Idarado management felt compelled to dismiss Miller in 1946 for failing to maintain his previous membership in the union.

Three months later District 50 won an election and became the new bargaining agent of the Idarado employees. It then pressed Miller's claim that he was hired as a "new employee" when he took the watchman's job and was not required to join MPW. The company believed it was rehiring an old employee. NLRB decided in favor of District 50 and ordered the company to pay more than 2 years back wages to Miller.

Silver Summit Discovery

(*Continued from Page 73*)

their mine. Silver Dollar is continuing exploration from the new 2800 level which is also located near sea level elevation. About three miles toward the east, Vulcan Mining Co.'s shaft is being extended to the 3000 level by the American Smelting and Refining Co. and Day Mines, Inc., and a large program of deep level exploration is planned for the area tributary to this new shaft.

The East Silver Belt Area is receiving considerable attention by the Hecla Mining Co., through its subsidiary, the Rock Creek Mining Co. During the year much surface bulldozer work was done. A long tunnel is now being driven to explore favorable conditions found in that project. This is extremely interesting because it is testing a large area of intensely bleached rocks showing several strong zones of mineralization in a part of the district which has had little attention. Some results may be expected this summer.

Acknowledgements

The writer wishes to express his appreciation to many operators and geologists of the district for their cooperation; to Mr. Hanley, president of Hecla Mining Company, for permission to publish this article; and to P. M. Lindstrom, Hecla geologist, for his aid in the preparation of illustrations.

BIBLIOGRAPHY

1. Sorenson, Robert E., "Deep Discoveries Intensify Coeur d'Alene Activities." Eng. and Min. Jour., Vol. 148, No. 10, Pp. 70-78, Oct. 1947.

2. Shenon, P. J., and McConnel, R. H., "The Silver Belt of the Coeur d'Alene District, Idaho." Idaho Bur. of Mines and Geo. Pamphlet No. 50, May, 1939.

3. Schwab, Charles E., "Mining Method Expands Lead-Zinc Reserves." Min. Cong. Jour., Vol. 34, No. 4, Pp. 72-73, April, 1948.

NEW FORD TRUCKS for 1948 have three new power plants of 95-hp., 100-hp., and 145-hp. Two new series of the 1948 line of trucks are the largest trucks Ford has ever made. The ½-ton truck shown above has a 6½-ft. pick-up body. It is a part of a line that ranges up to 3-ton capacities.

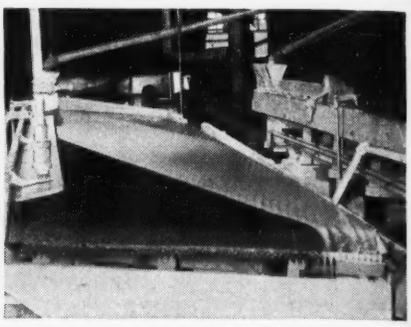
NEW RESEARCH CENTER of Jeffrey Manufacturing Co., Columbus, Ohio, is completely equipped for test work in the company's field. A. W. Lemmon is manager of research and development, chain and material handling division; J. A. Flint is manager for the crusher and Traylor division; Sterling C. Moon is manager for the mining divison; L. E. Newell is superintendent of research manufacturing and testing.

One-Man Chain Saw

A new one-man chain saw with an 18-in. cutting capacity and powered by a 2-cycle, air-cooled gasoline motor delivering 3½-hp. at 4,000 rpm. has been announced by Disston & Sons, Inc., Philadelphia, Pa. The unit is reported to be especially useful for light felling, for limbing, and for construction timber cutting. Control of the saw is concentrated in a well-designed pistol-grip handle. The throttle is at the operator's finger tip with the fuel mixture control level nearby. A priming valve is provided for easy starting in cold weather, or when the engine has been run dry. A squeeze of the handle disengages the clutch, and releasing a safety catch re-engages it.

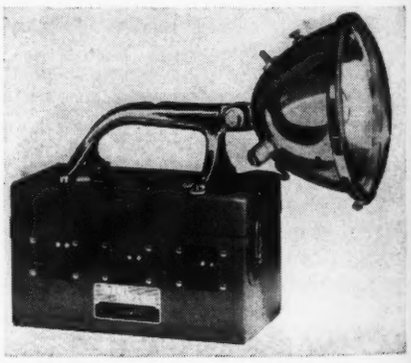
Compound Aids Welding

An "Anti-Capillary Compound" for use with Eutectic low-temperature welding rods has been announced by Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. The paste is designed to confine the flow of molten alloys to the limited area upon which the weld is to be applied. The new compound also protects the parent metal from discoloration at welding temperatures, and assists in retaining the brightness of the metal. Possibilities of distortion are decreased because welding temperatures may be confined to the specific area being welded. The compound can be applied by painting, or if diluted with water, by spraying.



Differential stroke cycle concentrating table Model 46, made by James Equipment, Inc., Newark 5, N. J., may be adjusted for efficient operation in a few minutes by merely changing the stroke characteristic.

Caterpillar D-4 tractor shown equipped with a Hyster D-4 towing winch and auxiliary drum is useful for many operations around mines, mills, and smelters.



Rechargeable hand lamp contains indicators to show the state of the charge in each cell. They are built into Model 311 hand lamp recently announced by U-C Lite Manufacturing Co., 1050 West Hubbard St., Chicago 22, Ill. The battery case of the lamp has windows in each cell in which are visible three balls of different colors. The position of these balls indicates the condition of the cell. The lamp throws a 2,500-ft. beam.